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The Gas Machinery Co.

Cleveland, Ohio

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Vol. CXI, No. 12 NEW YORK, SEPTEMBER 20, 1919 Whole No. 3211

New Industrial Markets for Gas Are Never Ending—The St. Louis Company Finds Gratifying Possibilities Among the Egg Sterilizers

A Boiler to the Eyes of J. J. Burns Means a Likely Sale of a Considerable Amount of Gas—Gas for Making Cake Filling

By JAMES E. DARST

Practically every manufacturing firm that uses boilers in the making of its product or to assist in the manufacture, is a prospective customer for gas, believes J. J. Burns, superintendent of the commercial department of the Laclede Gas Light Company of St. Louis.

• Gas companies in the average town in these United States can get a lot of business that may now be going to coal companies. It is business that legitimately belongs to the gas company by reason of its products being much more convenient to use and less expensive in cases where only intermittent and not steady use of heat is desired.

The Laclede Company's belief in the gas boiler business is fairly indicated by the fact that they have a division of their commercial department devoted exclusively to the sales of gas boilers for industrial and household use.

The Laclede Company believes that a boiler indicates the strong possibility of gas sale because the very use of a boiler by a concern indicates its desire for steam, and steam can be produced cheaper and quicker by the use of gas than by the use of coal. It doesn't take hard salesmanship to prove this fact to the prospect and usually the change to gas is made in spite of previous installation. In cases where equipment has not yet been installed it is much easier to see to it that a gas boiler is used instead of one that utilizes coal as a fuel.

Wide Opportunities for the Gas Steam Raiser

A type of boiler that Mr. Burns says has found a quick sale is known as the Gallaher gas boiler, made by A. J. Gallaher, 1946 North Broadway, St. Louis, Mo. This boiler has automatic control and several added mechanical features of superiority. It was adopted by the Laclede Gas Light Company on account of its high efficiency—83 per cent—low maintenance cost and its delivery of absolutely dry steam.

Armed with a prospectus of this boiler and a line of gas sales talk the commercial department of the Laclede Company has recently put gas into several industries in St. Louis that had never before used gas. It is believed the installations are unusual in the whole country.

A new concern that recently adopted the Gallaher gas boiler and is using many thousand cubic feet of gas where before it had used many tons of coal, is a cordial company, makers of fruit juices for soda fountains and for bottling.

The company makes use of a pasteurizer to prevent all possibility of fermentation of their product and the active principle of this pasteurizer is a pipe within a pipe. The outer or steam pipe is of 2-in. diameter. The inner or fluid pipe is of aluminum and of 1-in. diameter. The travel of fluid and steam is in opposite directions. The pressure of the steam has to be accurately regulated so the fruit juice people were inclined to listen to the recital of the advantages of a boiler that provided for such regulation. Obviously, too, gas was the logical fuel for such manufacturers to use, being more economical and more handy. They were sold in short order.

With the increased manufacture of fruit juices in all parts of the country, due to prohibition, it seems that a fertile field for the alert gas salesman is opened up.

Egg Sterilizing

Another place where gas is the logical fuel is in egg sterilizing plants. The Laclede Company recently has sold a company that sterilizes eggs for St. Louis commission men. This is a growing industry.

All broken eggs, which formerly were discarded or were sold at a loss, are broken by girls and the contents thrown into copper vessels. The vessels and their contents are then subjected to a sterilizing process which is accomplished by the application of live steam. The egg content is then sealed in cans and sold to hotels, bakeries, cracker and cake manufacturers and other large users of eggs.

Gas is the ideal fuel in this industry because of its cheapness and because of the fact that it can be readily applied to the degree of heat required. Egg sterilizing companies are coming into business in increasing numbers and the gas salesman should see to it that his product is the fuel used.

Another new industry that the Laclede Company recently lined up for gas is a company that makes marshmallow for cake filling. Gas is used by this concern both to cook the product and to sterilize it to prevent fermentation.

Melting Glue

Several paper box factories in St. Louis recently have been convinced that gas is the ideal fuel for them, especially in the melting of glue and keeping it at a uniform temperature. One of the largest wholesale dry goods houses in the country, that maintains its own paper box factory, recently adopted gas as a fuel. The company also installed a Gallaher gas boiler for steam cooking in the employee's lunch room, where 350 employees are provided with dinner at cost.

Label manufacturers are also easy prospects for the use of gas as their fuel. Recently the making of gummed paper tape to be used by stores instead of twine has become a prosperous business. This paper tape is extremely tough, is gummed on one side and is printed with advertisements for the users on the other side. Packages are gummed together instead of tied together. Manufacturers of this tape need dry steam to quickly dry their product and steam coils leading from boilers are being used.

One of these companies in St. Louis was sold by the Laclede Company because the supply of dry steam could be regulated so much easier when a gas boiler was used. The labels made by this company, after passing on a belt through coils of dry steam come to the end of the belt ready for packing.

And the Hat Companies Too

Among other industries recently converted to gas in St. Louis are several hat companies, three ice-cream cone manufacturers and one maker of ice-cream cartons. Undoubtedly the use of gas as the logical fuel is becoming more general in a wide number of industries. It only needs a little sales talk to make the field even more broad.

A wide use of the Gallaher boiler in residence heating also is reported by the Laclede Company. The capacity of the boiler ranges from 200 sq. ft. to 6,000 sq. ft. of radiation, which takes care of everything from the cottage to the palatial mansion. In Westmoreland Place, St. Louis, one of the finest residence districts in the country, more than 50 per cent of the houses use the Gallaher gas fired boiler. Every user, without exception, is an enthusiastic endorser.

Accidents in Gas Plants Few in Comparison with Other Manufacturing Establishments

L. G. Adams, Gas Engineer for the Illinois Northern Utilities Company, Believes the Safety of Gas Plants Is Due to Continuous Careful Inspection

That accidents in gas plants are few in comparison with those in other manufacturing establishments involving anything like a comparative risk is the declaration of L. G. Adams, gas engineer for the Illinois Northern Utilities Company. Interest in gas plant hazards is at a high point just now in Chicago, in anticipation of the meeting of the Public Utilities section of the National Safety Council in Cleveland October 1-4, which many Chicago men connected with the gas industry expect to attend. Mr. Adams' affirmation that the crux of the safety problem in gas plants lies in careful and continuous inspection therefore is a timely opinion.

Mr. Adams maintains that, although the operation of a gas plant includes in addition to practically all the hazards of the ordinary plant, those attendant upon the use of fires involving great heat, a dangerous gaseous atmosphere in certain parts of the plant, and in hand-fired coal gas plants, the use of unwieldly and long-handled tools, still, accidents are at a comparatively low level. This is due, in his opinion, to the sturdy construction of gas plants, and to careful inspection throughout the 24 hours of operation.

"A plant which runs successfully and efficiently must have this careful and regular inspection," he declared, "as any neglect of this important part of the routine almost immediately results in stoppages, irregular operating results, and apparatus out of commission. This condition is at once apparent to the management, and those in immediate charge of operating know that they will be called to account therefor. It follows as a matter of course that superintendents, foremen and other operatives anticipate such troubles and watch the apparatus for such defects and conditions as would cause accidents, interrupt the continuity of operations, or make the work more difficult.

"It is almost a truism that a well inspected, carefully looked after plant operates efficiently and that when inspection is neglected and apparatus allowed to run without proper attention, to a point that undue danger arises therefrom, operating results suffer and accidents occur."

A succession of minor accidents to employees, Mr. Adams continued, was a sure sign to the management that care and watchfulness was letting down, and a warning of future trouble. This is a very strong argument for the practice of ascertaining the cause of having all personal injuries, no matter how small, so that the management can detect and correct conditions which might lead to more serious injuries.

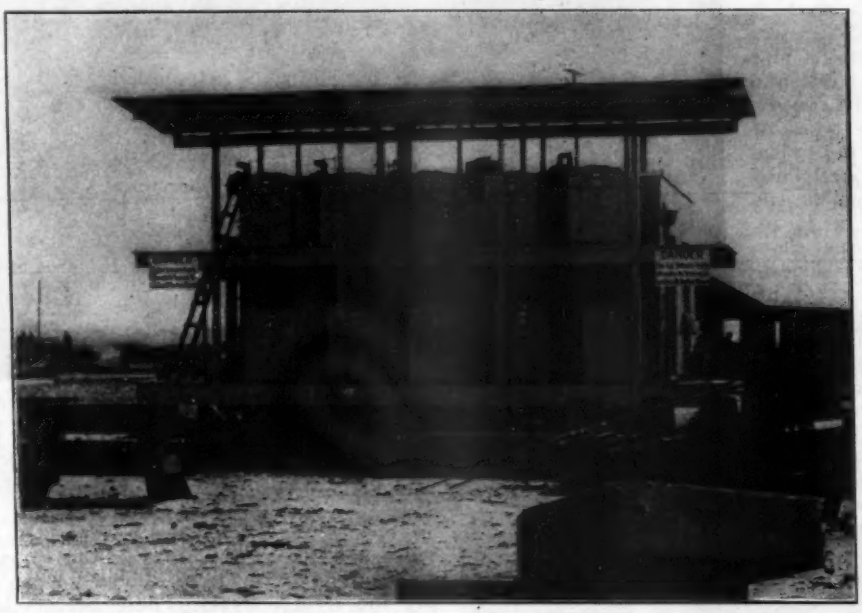
"Gas plant employees as a whole recognize the special hazards in the way of misplaced tools, obstructions, defective apparatus, flame and flash damage and dangers of worn and dangerous tools," he continued, "and it speaks well for these employees that accidents of a serious nature are as rare as they are. If an especially careless and heedless employee becomes a nuisance in this respect the older men very rightly manage to let him know that if he does not correct his ways, his position will be made very uncomfortable for him.

(*Continued on page* 246.)

Taken On as a Wartime Expedient Gas Proves a Saving and Convenience and Has Become a Recognized Fuel for Industrial Purposes in Shipbuilding

J. J. Mulgrew Points Out How in Rivet Heating Four Damaged Oil-Heated Rivets Are Thrown Away as Against One Heated by Gas—224 Cu. Ft. of Gas to Heat 180 Rivets—Furnaces 40 Ft. Long by 4 Ft. Wide for Shaping Iron—Average Daily Consumption of One Plant 300,000 Cu. Ft.

Gas was first used in war construction work when costs were a secondary consideration; it was then a question of getting work done at any price. Gas was known to be a convenience and was immediately available, so it was given a tryout. It not only proved a convenience, but developed a saving not anticipated, and it has now become a recognized fuel for industrial purposes in shipbuilding work, declares J. J. Mulgrew, of the industrial gas department of the Pacific Gas & Electric Company in *Pacific Service Magazine*. The Pacific Coast—Oakland in particular—has the credit of being the first section of the country to use manufactured gas generally for shipbuilding purposes.



THIS BATTERY OF TEN GIANT GAS METERS (NOTE SIZE COMPARED WITH THE MEN SITTING ALONGSIDE) PASSES 30,000 CU. FT. PER HOUR. THIS SCENE IS AT THE UNION CONSTRUCTION SHIPYARDS

Risk in Oil

Crude oil and coke are the fuels generally used. The oil has to be carried in cans to the rivet-heaters which, necessarily, are located close to the work. Some of the oil, naturally, is spilt en route, and it is generally spattered about in being poured into the tank container on the rivet-heater. The spilt oil makes the flooring not only slippery and dangerous, but a fire risk as well. Men have to move about cautiously, and this entails loss of time aside from the possibility of injury, for those who become reckless meet with accident. To avoid this a large crew is constantly employed cleaning up the oil, and even at that the clean-up is not entirely satisfactory. A cleaning crew of ten to thirty men was required, besides men to pack oil to the heaters. The use of gas obviates all danger of accident, speeds up the movement of the men and cuts out the crew-cleaning expense.

Waste in Rivets and Time With Oil and Coke

Another important discovery developed from the use of gas. Where rivets are heated by oil fire or coke a scale will occasionally form on the outside of the rivet, and when it is being driven this scale will peel off so that the rivet does not fit tight. The rivet then has to be taken out by a burning process which is not only a delay, but a difficult task. It was found that gas rarely caused such scale. Also, it developed that gas-fired rivets were comparatively free of pitting and iron burn. These defective heated rivets are readily detected and are thrown aside. Where an oil-fired and gas-fired heater are worked side by side, the pile of cast-away rivets shows about four to one in favor of gas. The gas heating is not quite so quick as oil, which latter gives about one rivet in fifteen seconds of time. The difference, however, is but a few seconds, which can be overcome by building a larger gas firebox should this slight time saving be essential.

The Hanlon Shipyard and Drydock Company was the first to become interested in the possibilities of gas.

The offices of the company were being heated by gas. The general manager had been watching the system and became impressed with the ease of control. About that time the Government began changing orders for construction of ships from wood to steel. This meant that the wood-ship building yards would have to change all their machinery and tools. The congested freight conditions made it almost impossible to get prompt delivery from the East, regardless of priority orders, besides which new outfits were costly. So the Hanlon people, through their vice-president, L. Wilhelmson, and engineer, D. Young, turned to the consideration of gas. Home-made rivet-heaters were tested out with such satisfaction that these two gentlemen immediately designed a gas furnace to heat angle iron and steel plates. The plans satisfied them that appliances could be made at home for a small cost. Samples were built and after many tests the management became convinced and ordered the adoption of gas.

Gas Used per Rivet Heated

It is an interesting sight to see the white-hot rivet pulled out by long-handled tongs and then thrown to some distance where it is caught in a can. It is quickly nabbed out and thrust into place where the air hammers drive it home. Again, the hot rivet is pulled out of the furnace and dropped into a pipe which shoots it down into the hold of the vessel. There are three types of rivet-heaters in use. The firebox is plate steel lined with firebrick, and the gas is connected by a ¾ in. heavy hose. Tests show that rivet heating is done at the rate of 3¾ x 2½ in. rivets per minute on a basis of 244 cu. ft. of gas per hour. The immediate saving is in deck cleaners necessary where oil or coke is used. There have been some remarkable records made by individuals in driving rivets. The average number driven per day depends upon the location of the work, and this average will vary from 900 to 1,200 a day per man.

IN THIS MAMMOUTH GAS FURNACE IRONS UP TO 40 FT. IN LENGTH ARE HEATED, THEN PULLED OUT ON TO THE IRON PLATFORM AND THERE BENT INTO THE DESIRED SHAPE. THIS FURNACE IS AT THE HANLON DRYDOCK AND SHIPYARDS. IT HAS BEEN IN CONSTANT USE OVER A YEAR AND HAS HAD LESS THAN $50 EXPENDED ON IT IN REPAIRS.

The Mixing System Employed

The gas burners are specially made under the Selas System. This is a system of mixing air and gas and is an interesting process which, briefly, is as follows:

The machine is operated by a 10 hp. motor. Air is taken in on one side and gas on the other. The gas is then reduced to atmospheric pressure, or air pressure, so that the two are balanced; then both are drawn into a mixing chamber in the proportion of one part gas to one and one-half air. This mixture is then compressed to about 4 lbs. pressure and sent forward through pipes to the appliance. In the appliance the mixture passes through the Bunsen air mixer, where additional air enters for the complete combustion of burning of the gas. The partial mixing, or pre-mixing of gas with air by the Selas System prepares the gas to readily saturate with air when it reaches the Bunsen. This is on the theory that where gas passes through the ordinary Bunsen it is only streaked on the surface, or stratified with air. This is explained on the principle of a dry sponge passing through water; only the surface will get wet; whereas, if the sponge is moist it quickly saturates. So, if the gas is "dry" of air it picks up air only near the surface, whereas if the gas is mixed or "moist," as it were, with air it readily saturates with air in passing the Bunsen, or air opening. The Selas Bunsen is specially made so as to prevent any back fire in the burner. It prepares the gas for complete combustion and thereby produces a very high flame temperature.

Pipes Up the Sides of Ships

The Selas gas-mixing machines are located in a central part of the plant and the distribution pipes are run thence to the different docks and shops. The pipes are run up the sides of the ships and thence connections are made by rubber garden hose to supply the rivet-heaters. These heaters are generally located on the deck of the vessel from which the assembling is done.

Big Furnaces With Checkerboard Platforms

The big gas furnaces are located in the shops. These platforms are full of square holes like a checkerboard. Upright pegs, or clamps, are put in these holes, making the form or pattern around which the hot iron is bent into shape. The gas is supplied by 20 burners staggered on each side with the flame inclined upward toward the arch. The entire lining is firebrick. The gas is supplied by the Selas System as previously described. The furnace requires about

4½ hours to reach working temperature, which is between 1,850 and 2,000 deg. Fahr. Channel iron 8 in. wide and 40 ft. long is heated in about 20 minutes, uniformly throughout, bent and hammered into shape with one heat. Gas consumption averages 6,000 ft. per hour. Small irons are handled in less time and with less gas. This type of furnace is of high efficiency because of temperature control, low cost of maintenance, absence of smoke, oil fumes and dangerous flames. Small furnaces are used for heating small plates and for case hardening of special parts. The gas consumption of one of these large plants will average 300,000 cu. ft. per day. This amount of gas would supply the average daily needs of 3,000 families, or the equivalent of a town of 12,000 population.

Business Enough Booked to Keep Going a Year at Full Capacity

The importance placed upon gas may be better realized if we consider, briefly, the magnitude of the shipbuilding concerns themselves. All of the shipyards are doing a greater business to-day than a year ago. The Government canceled a number of contracts, yet the yards have a sufficient number left to keep them busy for more than a year at the present rate. The vessels now under construction in San Francisco Bay show an industry far greater than the average person realizes. The following shows the tonnage building as compared with a year ago:

	1918	1919
Bethlehem Shipbuilding Corporation.	77,376	116,400
Hanlon Drydock and Shipbuilding Company	10,360	26,750
Moore Shipbuilding Company.....	94,000	172,800
Union Construction Company.....	.....	37,600
Pacific Coast Shipbuilding Company.	.....	56,400
Schaw-Batcher Company	35,200	61,600
Total	216,936	471,550

This means 51 ships now building.

The Hanlon Shipyard and Drydock Company started several years ago in a small way building wooden vessels for coast trade. To-day it represents an investment of $1,000,000, with a payroll of 1,500 men. The Hanlon people are putting in a series of large drydocks and will make a specialty of repairing vessels. When these docks are completed the payroll will be increased by close on to a thousand more men. The Hanlon people have received letters of inquiry from all parts of the East asking as to the use of gas and for an expression of opinion as to results. It shows the publicity gas has given to these people who have had the courage of their convictions which has marked the program of the firm.

Gas in the Largest Machine Shop West of Chicago

The Bethlehem Company operates one yard in San Francisco and the other on Oakland Estuary. The latter yard has six ways. To-day there are eleven big merchant ships building for the Government. Six of these are on the ways and five in the water being fitted with their engines. The turbine and machine shop is 800 ft. long and 200 ft. wide, two stories high, brick and glass construction assuring solidity and ample light. It is the largest machine shop west of Chicago and represents an investment of a million dollars. The plant cost $5,000,000 and it employs 8,000 men. The cafeteria, which is a novel gas installation for cooking, seats a thousand men at one sitting. Gas is the exclusive fuel for cooking, and will ultimately be the exclusive fuel for metal work and heating. Two large angle iron furnaces are being converted to gas. About 240 rivet-heaters are now operating on gas, besides small furnaces and forges. This concern will be using close to a million cubic feet per day by the middle of this year.

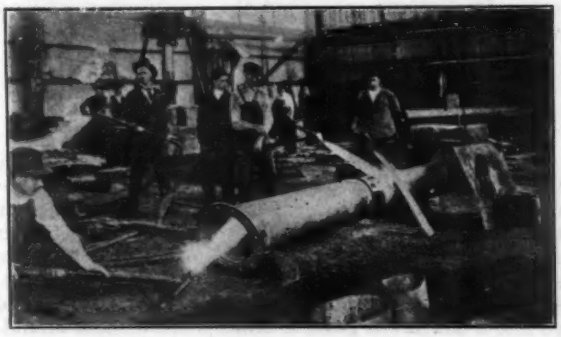
Other Available Markets

The Union Construction Company on Oakland's western waterfront covers 38 acres. It has contracts for ten steel vessels at a cost of $17,000,000. Its first launching was April 26, 1919, when a 9,600-ton ship was christened. The hull had no more than slipped into the water when, within an hour, a keel was in place for another vessel. June 12, 1919, celebrated the launching of a similar ship named Berkeley in honor of the university town. The vessel is 412 ft. long and 68 ft. in width, built for the Emergency Fleet Corporation.

The Moore Shipbuilding Plant, also at Oakland, has 18 ships under construction with a payroll of 8,000 men. This firm held the record of launching three vessels in on day during the war. This triple launching feat was again repeated this year. On April 27, 1919, in honor of the return of the Oakland boys, the 159th Regiment, three vessels were again launched. This is the oldest and largest yard on the East Bay Shore.

They Think Twice When a Big Investment Is Tied Up in Coke and Oil

This company more recently adopted gas. It has an enormous investment tied up in coke and oil equipment and an exhaustive study was made before the change would be considered. Its vice-president and general manager, J. H. Moore, was most exacting in its analysis. For instance, two of their best rivet drivers were selected. One had the Coast record for the number of rivets driven per day. In this test more rivets were driven gas-heated than by oil. It was shown that the gas-heated rivets were softer and therefore drove better. The gas rivet is uniformly soft; the oil or coke heated retains a harder core when hot. The rivet furnaces proved out 50 cu. ft. per hour less than the guarantee. Thus, every detail was sifted first hand before decision was reached and before the big changes were



CITY GAS TORCH HEATING COPPER PIPE IN THE COPPER SHOP OF THE SHIPYARD OF MOORE SHIPBUILDING COMPANY, OAKLAND, CAL.

authorized by its board of directors. Letson Balliet, of the company's engineering staff, when asked as to their deciding factors, kindly furnished the following data:

GAS QUICKLY SAVES ENOUGH TO PAY FOR CHANGES

The use of gas in rivet heating would quickly save the entire cost of the change after the gas was in use.

The bull riveters would put in 300 to 500 more rivets per day.

Oil-heated rivets ruin two to three dies per day; not so with gas.

Rivets not burnt or lost; no time lost cleaning forges.

Rivets softer; no scale, no hammer to get them into holes; drive better; better when finished; use less air in driving and put less wear and strain on hull or gun.

No compressed air for forges, such as for oil or coke, saving $1 per day each, besides saving on hose.

No deck crews cleaning up spilt oil and coke, handling oil and coke, crane, time, etc., a saving of $500 per day.

A TON OF RIVETS SAVED PER DAY

A ton of burnt rivets saved per day; time saved burring out bad rivets and re-riveting.

Working conditions promote speed by eliminating excessive heat, smoke and dust in holds of vessels.

The entire equipment was installed in the Moore Shipbuilding Plant and the distribution system completed within 20 days after the work was commenced.

6,000,000 CU. FT. USED IN THE CONSTRUCTION OF ONE SHIP

During the rush of shipbuilding in the last months of the war the time record of shipbuilding was cut in half and hulls left the ways a month after the keel was laid. More than 40,000 tons were launched from one slip in a year. Since the armistice was signed the desire for speed has given way to the desire for better ships. This change has increased the efficiency of the yards. Work has been reduced to one shift and all overtime cut out. The efficiency of men and appliances are closely studied. Gas, likewise, came under a severe scrutiny and test. The price of gas has formerly held it back. The apparently low number of heat units, compared with other fuels, has had a tendency to keep it from being used industrially. However, within recent years, it is being found that the first cost of material is not always the controlling consideration. The case of handling gas and its directness have proven large labor-saving factors. Its cleanliness is not only a saving of labor, but has direct effect in making a better product. There is less scaling and burning of the iron and steel. Six million cubic feet of gas enter into the construction of each vessel of average size.

Accidents in Gas Plants Few in Comparison with Other Manufacturing Establishments

(*Continued from page* 242.)

"The great number of changes in personnel during the last two years have had the inevitable effect of lowering the percentage of experienced and tried men in the plants, and the necessity is correspondingly greater for inspection, conferences, and counsel by foremen, superintendents and executives. Much of this discussion should center around the fact that no man should go into a dangerous gaseous atmosphere without attendance; and about the care and operation of that much be-deviled piece of apparatus, the gas house boiler."

The United States Fuel Administration Investigating Natural Gas Resources Says Wasteful Practises May Be Traced in Last Analysis to Cheapness

During the war the oil and gas section of the fuel administration carried on an active campaign to induce people to prevent wastes of both oil and gas. Appropriations are annually made by Congress for conservation work through the bureau of mines of the interior department, and there is now a force from the bureau in the North Texas oil fields to educate the producers and consumers in the matter of saving these natural resources. The campaign is being aided by the Smithsonian Institution, which issued a statement showing how natural gas is produced and the extent of the wastage.

The statement says that the present cost of living investigation has been directed largely to food and clothing, but back of them, in fact, of all manufactured articles is the question of fuel. The part played by coal and oil is familiar to the public, but that of natural gas is far less generally known, particularly in the sections where gas of artificial nature is not obtainable. The statement says in part:

GAS SEEKS HIGH LEADS

"Gas occurs in the earth where in the process of following its natural tendency to rise, it has encountered a cap of impervious rock. Here it constitutes what is known as a pool and the porous rock containing it is termed gas sand. The unknown underground supplies of natural gas are found by drilling.

"The deepest gas well, and incidentally the deepest hole in the world, is about 7,000 ft. deep, or a little over a mile and a quarter. Another hole even deeper than this is now being drilled in the same region in the hope of striking gas.

"To protect the hole an iron pipe called a casting is driven down into the rock formation always found above the gas-bearing rock. A plugging device known as a packer is fastened in the casing or hole in the rock, immediately above the gas formation, and the gas by virtue of its inherent expansive tendency then comes to the surface through tubing, and forces itself into the transmission lines.

"As the gas travels the pressuure must drop and this necessitates the installation of gas compressors. When the gas reaches the distributing plant it passes into the medium pressure lines in the city, and the pressure is then reduced to the low pressure lines, where it travels through the mains at probably 5-oz. pressure to the square inch; then through the service line, consumer's meter and ultimately is burned at the consumer's fixtures."

APPALACHIAN FIELD

In states where natural gas has been a general fuel for a number of years, it is interesting to note that 10,000,000 householders and thousands of industrial plants are served with natural gas from what is termed the Appalachian field, including Ohio, Kentucky, West Virginia, Eastern Indiana and western parts of New York. Where natural gas gives out, the statement

(*Continued on page* 259.)

Gas an Important Factor in the Manufacture of Fountain Pens

Melts the Gold for Making the Nibs, Fuses the Iridium Point onto Them, Vulcanizes the Rubber, Anneals and Hardens the Clips, Nibs, Feed Wires, Etc.

By GILBERT C. SHADWELL

It was pointed out by the author in an article* published in the June 12, 1919, issue of the AMERICAN GAS ENGINEERING JOURNAL that the life of the ordinary steel pen is of short duration as compared with the gold—iridium tipped—pen point used in the better fountain pens to-day. Exterior reasons were not entered into at that time as the explanation of that and many other features

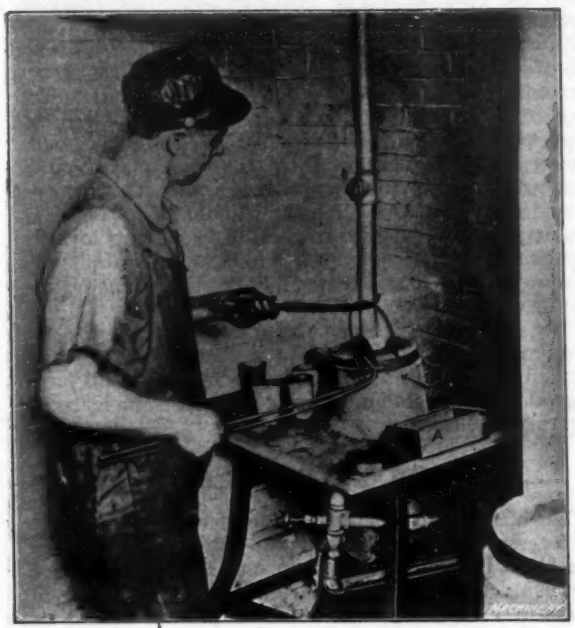


FIG. 1

belonged to a discussion of fountain pen manufacture, and as a result were reserved for an article on that particular phase of the subject.

Almost every industrial fuel man knows that gas plays an important role in the making of fountain pens. Heat is required in the melting of the gold for making the nibs, fusing the iridium points onto the pen-nib points, to say nothing of vulcanizing the rubber, annealing or hardening the clips, pen-nibs, feed wires, etc.

MAKING THE GOLD PEN-NIB

The gold for the pen point is received in the form of ingot measuring about 2½ in. long by 1½ in. wide by ¾-in. thick. Each is worth from $500 to $1,000 depending on the size. Pure or fine gold is called 24 carat, but 24 carat gold is far too soft to use for fountain pen nibs so that it is necessary to alloy it to make it harder and stiffer. The writer understands that the alloy used with the best 14 carat pen points or nibs consists of 14 parts pure gold, 5.5 parts silver and 4.5 parts of copper. The fine gold is melted with the alloy in a crucible as shown in Fig. 1. Here the proper proportions of gold, silver and copper are mixed in, the amounts being 233½ dwt. —pennyweight—of fine gold, 92 dwt. of fine silver and 76 dwt. of fine copper. This, when cast, produced an ingot 10 in. long by 1 in. wide by ½ in. thick weighing 401.5 dwt. The reason for making a block of this weight is that when it is rolled out to the proper thickness it makes a sheet which can be conveniently handled. This alloyed gold is thus 14 carat which is the standard for fountain pen nibs.

Following the production of this ingot which is cast in the mould or iron box shown at "A"—Fig. 1—the block of gold is conveyed to the rolling mill, where it is passed through the steel rollers from 15 to 20 times until it is rolled out into a sheet of the required thickness. Rolling has the effect of hardening with copper and gold to quite an extent, as a consequence if it carried too far without annealing it is likely to produce cracks; it is therefore necessary to roll up the sheets and heat them to a dull red heat in an annealing furnace after which the sheets are allowed to cool down gradually. Each sheet is generally annealed twice before it

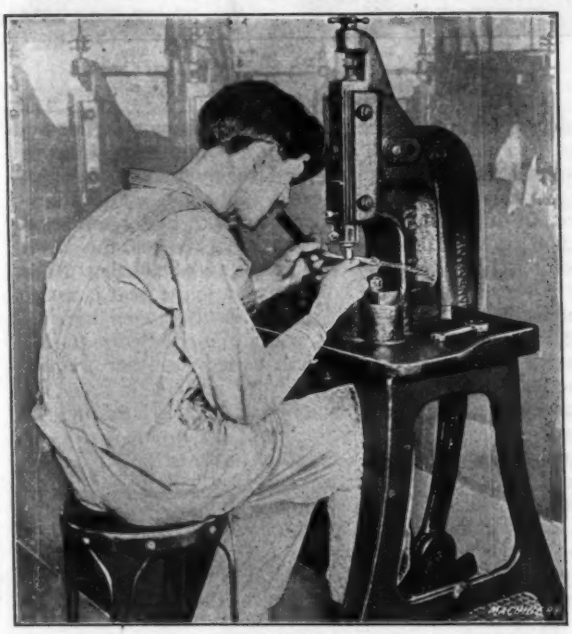


FIG. 2

*The Use of Gas in the Manufacture of Steel Pens, AMERICAN GAS ENGINEERING JOURNAL, Vol. —, No. —, 1919, page —, by Gilbert C. Shadwell.

is rolled out to the required thickness, which is approximately one sixty-fourth of an inch. The blanks for the pen nibs are again rolled out to the exact thickness after the iridium has been fused onto them.

After rolling the gold to the correct width and thickness the strips are taken to the foot presses, one of which is shown in Fig. 2. The blank is cut out by means of a blanking punch and die to approximately the required shape. After blanking, the nibs are taken to a small milling machine where a narrow ledge is milled across the point, the object of which is to form a seat for the iridium to be fused on.

A word with regard to the metal iridium may not be out of place at this point. The origin of the name is rather peculiar and may not be known to most gas men. It seems that in 1803 Smithson Tennant found that the metallic residue which remained when platinum ores are dissolved contained two other elements. To one of these he gave the name "iridium" on account of the iridescence or varying color of its salts, as to the other he gave the name "osmium."

Hence we see that iridium is found in platinum ores—in fact it exists in considerable quantities in the form of the alloys platiridium and osmiridium. The first of these occurs in grains and frequently in cubes with rounded

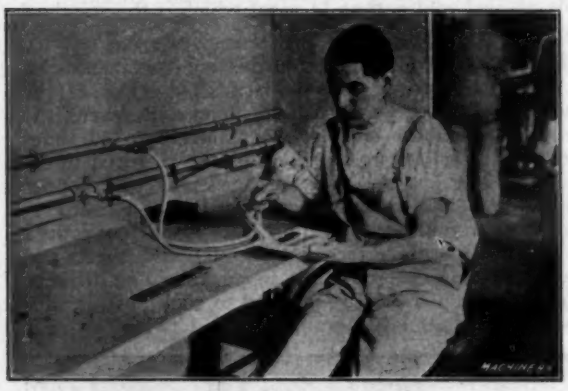


FIG. 3

edges. Iridium is one of the hardest known metals and used to cost as much as $1,500 a pound even when secured before the war (in the Ural mountains) between European and Asiatic Russia (Siberia). The atomic weight of iridium (in comparison with hydrogen equals 1.008) is 191.5; the specific gravity is 22.4 and the fusion point is between 3540 deg. Fahr. and 3960 deg. Fahr. It is very brittle in the cold but at a white heat is rather malleable. The specific gravity of the fused metal is 22.15. The extraction of iridium is carried out in a manner somewhat similar to that used for other precious metals. It is hardly necessary to outline them as any gas engineer who is sufficiently interested can find the data in the majority of the more up-to-date works on inorganic chemistry. One point is important to be noticed and that is that in order to fuse iridium the use of city gas and air becomes almost impossible as the temperature is too high, although an electric furnace will do the work; nevertheless a gas-air brazing burner of the style well known to gas men takes care of fusing the gold and as will be seen presently this is exactly what is done.

WEAR RESISTANCE OF GOLD PENS

Gold pens have been found to resist the friction and wear incident to writing, as they glide over the paper better than pens made from any other metal. Gold is also used chiefly because of its non-corrosive and non-oxidizable qualities. Gold alone is soft, however, and will not last long. Before the adoption of iridium the gold pen point was tipped with minute diamonds or rubies, which of course made the pen very costly, besides being so unduly hard that the paper suffered. It was found, eventually that iridium could be fused into gold—or rather the gold fused around the iridium—and a much stronger and more durable pen point produced.

The granule of iridium which is used is usually about one-sixteenth of an inch square as a maximum, although generally the size used is far smaller; the exact size depends upon the width of the pen point. This is fused onto the gold pen. For stub pen point two granules are used—one on each limb of the nib. To accomplish this, the operator dips a camel's hair brush in the fusing fluid and applies this to the nibs. Then he takes a granule of iridium, holds it on the pen points with a pair of tweezers and locates it by means of a magnifying glass in the correct position. The pen points with the iridium granules on them are then placed on a charcoal block to prevent oxidation and the operator then fuses the gold around the iridium by means of a brazing burner (supplied with ordinary city gas and air at about 1½ lbs. from a positive pressure blower). In this way the iridium is retained in position. The operation is clearly shown in Fig. 3.

The reason for forming the seat on the pen for the iridium as already referred to is that the pen can be ground down flush on its under surface and still have a good layer of iridium to protect it and to increase its wearing qualities.

GIVING THE PEN RESILIENCY

The blank up to this point is considerably thicker than is necessary for the finished pen point, and to reduce the blank to about 0.008 of an inch thick, it is passed through a small pair of steel rollers. A horizontal slit is cut in the upper row in which the granule of iridium fits, so that it will not be broken during the rolling operation—because, as already explained, that metal is very brittle. It is necessary to roll out the blank to give sufficient resiliency, because the effect of fusing the iridium tip has been to anneal the nib. The shape of the pen point after rolling is distorted, so that it is now necessary to blank it out again.

After trimming, the heart-shaped hole shown at A in Fig. 4, from which the slit forming the nib-points

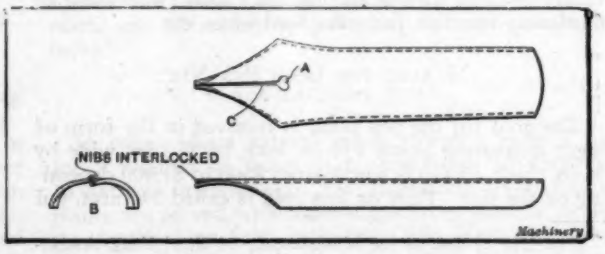


FIG. 4

FIG. 5

extends is cut in the pen-point. Then the number and trade-mark are stamped on in the screw press shown in Fig. 5, after which it is formed to the shape shown in Fig. 4 by means of a forming punch and die held in a screw press.

The next operation consists in slitting the pen point to form the two limbs of the nib (each of which is sometimes termed a nib). This is accomplished by the means of the operation in Fig. 6, in the following manner:

The pen point is held in a pair of tweezers A, which are supplied with a rubber handle. The operator grips these tweezers in his right hand, allowing them to rest on the support B. The pen C is then brought into contact with the rapidly revolving copper disc D, which is 3 in. in diameter by 0.0055 of an inch thick and rotates at 4,000 revolutions a minute. This disc is punched out from a copper sheet of the required thickness, and projects about three-eighths of an inch above the supporting washers E, which steady it while slitting the pen point. Naturally, as this disc rotates so rapidly it requires considerable pressure to bend or deflect it. The pen point is held on this disc by the operator so that the slit will come directly in the center of the heart-shaped hole.

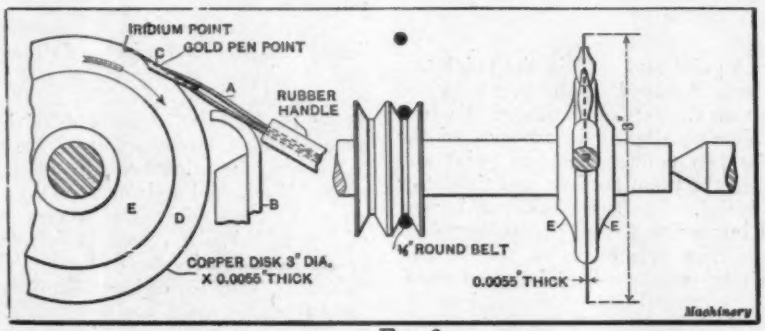


FIG. 6

The copper disc D is coated with the very finest emery mixed with oil which is applied to it by means of a piece of felt fastened to a stick.

It is impossible to slit a gold pen point tipped with iridium in the same manner as a steel pen is slit because the iridium, being so brittle, would fly into fragments, if a slitting punch oil were used. The emery-coated copper disc, however, works very effectively and cuts through the iridium so easily that it seems to require no special effort at all on the part of the operator. The slitting operation, however, requires considerable skill as the slit must be perfectly straight; that is if the slit is on a slant the pen points will interlock as shown at B in Fig. 4. This causes one side alone to bear on the paper and prevents sufficient ink from reaching the point; in fact the pen will hardly write at all. However, this can be fairly well rectified in grinding.

The operation previous to grinding requires considerable skill on the part of the operator, but the grinding of the pen point is really the most important of all. In this operation the pen point receives its final shape. The general view of a gold pen point grinding department is shown in Fig. 7.

The exact operation which is performed is shown more precisely in Fig. 8. The operator holds the pen point A in a pair of tweezers, and applies it to an emery-coated copper wheel B, which is provided with four different diameters, so that each part of the pen point can be ground to the required shape. This operation is so important and requires such skill that the shaping of the pen point cannot be watched with the naked eye but requires the aid of a powerful magnifying glass. The operator grinds a little, removes the dirt from the pen and then looks at it with the magnifying glass shown at C.

The slit is also squared up in this operation, so that the nibs will pass by each other freely without interlocking. The disk shown on the left end of the spindle, which is 3 in. in diameter by 0.007 in. thick, is used to square up the slit. The disk is made from taggers iron* and is coated with superfine emery applied with a piece of felt. The shape of the slit is clearly shown at C in Fig. 4. As will be noticed, it gradually increases in width from the point until it reaches the heart-shaped hole A.

A general view of the gold pen grinding department, in which the grinders are seen at work, is shown in Fig.

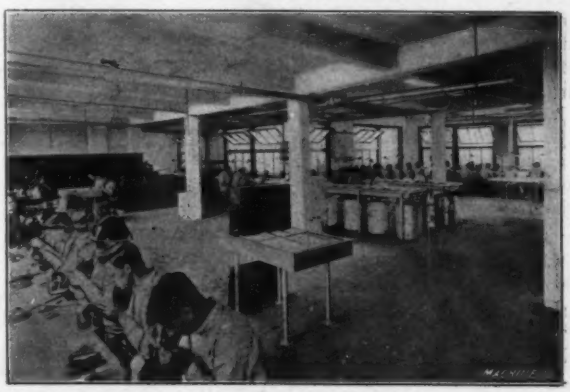


FIG. 7

*Taggers iron is the name given a class of very thin sheet iron, about 0.007 inch thick, which is used largely for metal tags, and no doubt derives its name from its use. This grade of sheet iron has a slightly mottled appearance due to the oxide adhering to the surface. It is a special grade of Russian sheet iron produced by hammering a pile of heated sheets having slight projections or indentations on its surface.

7; in this illustration can also be seen the washing troughs and the cans used in collecting the gold dust which adheres to the hair and hands of the grinders.

Each shape or grade of pen point requires a different "set," so that it will feed the ink freely and evenly. A stub point must have less resiliency than a fine point, so that the former will feed the ink much more freely than the latter. This "set" to the pen point is accomplished by hand. The setter grips the pen point between the first finger and thumb of both hands and moves the nibs back and forth past each other. Bending the nibs back and forth in this manner stiffens them and gives them greater resiliency.

The desired set is a matter of "feel" only. The setter, after moving the nibs back and forth, holds the nibs under a jeweler's magnifying glass and slightly depresses the frame of the magnifying glass on the nibs, spreading them apart. The amount of pressure required to separate the nibs is all that the operator goes by in setting the pen point. It can, therefore, be seen that the setting pen point is a matter of experience only, and the setter must thoroughly understand the action of the nibs for the different grades of pen points. Besides setting the pen point, the setter also smooths it upon superfine emery cloth so that it will write freely without scratching, all sharp corners being removed. The setting and final touching up of the pen point is the last operation.

Assembling the Pen Point—Feed and Point Section

To assemble the pen point and feed in the point section, the operator places the feed on the pen point, so that by looking down on the top of the latter the feed can just be seen projecting slightly in advance of the curved section of the pen point. The pen point and feed are then placed in the point section, and the latter is screwed into the barrel. The assembled pen is now held over a Bunsen burner to soften the rubber feed slightly. The feed is then pressed down on the pen point so that there will be no space at all between them. To see that the feed fits properly, the operator inspects it by means of a magnifying glass. If there should be a space between the under side of the pen point and the feed, the pen would overflow, which, no doubt, has been the experience of many a novice who has attempted to place a pen point in the point section.

The sectional view of the assembled pen, Fig. 9, shows the feed and pen point placed in their proper positions relative to the point section. This illustration also shows the twin rivet used in holding the Clip to the rubber cap. The ball is swaged onto the clip-cap instead of being soldered, as was the practice formerly followed.

Collecting the Gold Dust

The gold dust which results from grinding and working 14 carat pen points is worth about $12 an ounce, and as over 1,500,000 pens are turned out per year, it is evident that the waste is considerable. The sweepings from the grinding-room floor alone are sold for $4,500 a month, while over $500 worth of gold is reclaimed each month from the water in which the grinders wash their hands and faces. Every grinder is supplied with a new pair of overalls each "clean-up," and the old ones, which are burned, return as much as $5 in gold dust—a case where use increases the value.

The Pen Proper

We now come to the subject of the manufacture of the pen itself. It is to be doubted if the average user of a fountain pen realizes the accurate work and care which are necessary to produce it. The turning of the rubber parts presents difficulties which can only be mastered by careful and accurate work.

The crude "Para Beni-Bolivian" rubber gum, as it is called, is obtained from the Hevea Brasiliensis, which is a large tree 60 ft. or so in height which grows on the banks of the Beni River in Bolivia. These trees are tapped by cutting a deep horizontal slit near the base of the tree and a vertical one extending from it up the trunk; from both sides of the vertical incision, slits are cut at short distances apart, in an oblique direction. The tapping is done in the dry season, between August and February, in the evening and the "milk," as it is called, is collected the following morning in small shallow clay cups which are fastened below the horizontal incision by a piece of soft clay.

When these cups are full, their contents are poured into a larger receptacle. Each tree yields only about two ounces of milk a day, and as the L. E. Waterman Company alone uses 40 tons of rubber per year, this means that upward of 3,000 trees are required to produce sufficient gum—an industry of considerable magnitude in itself.

To produce the rubber, a wooden stick about three feet long, provided with a flattened clay mold at the end, is dipped into the receptacle containing the gum, or milk, the liquid spreading itself evenly on the mold. The milk is then carefully dried by holding the mold over a white vapor produced by heating certain oily palm-nuts, the stick being rotated so that the milk is evenly distributed and formed into a sort of gum. Each layer of gum is allowed to become firm before any more milk is added to it. An experienced man can make five or six pounds of gum an hour. The rubber cakes, or "biscuits," thus formed, are slit open in order to remove them from the mold, and are then hung up to dry. The crude rubber is brought down the Beni River, is inspected and is trans-shipped from the seaport Para to the factory, at which place the crude rubber is manufactured into the rubber pen parts.

Washing and Grinding the Crude Rubber

After the gum has soaked in hot water for about two weeks it is taken to the grinding machine shown in Fig. 10, where it is passed through 15-hp. grinding rolls. These grinding rolls B, one of which is shown, chew up the rubber A, and cold water, forced out of the pipe C, washes the dirt out of it. The rubber is put through these rolls several times until it is cleansed and thoroughly "masticated." After washing, it is placed in a heater, kept at a temperature of about 135 deg. Fahr., where it remains a couple of weeks. Then it is put through another pair of rolls where it is again ground and the sulphur is mixed in. One of the rolls travels faster than the other, which tends to strip and separate the rubber sufficiently to allow the sulphur to work in. The correct quantity of sulphur is here mixed in, the operator tearing the rubber off as it comes through, and passing it through again. The operation is repeated un-

(*Continued on page* 254.)

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SIXTY-FIRST YEAR

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As the Journal Views It

If You Want to Get Out of the Rut of the Commonplace Take Up Industrial Fuel

By the way of showing what *can* be done, the AMERICAN GAS ENGINEERING JOURNAL publishes this week what is in effect an industrial fuel number.

Verily the range and the interest contained in this rapidly developing branch of the gas business is without limit.

For three years the AMERICAN GAS ENGINEERING JOURNAL has been publishing industrial fuel articles on installation, ranging from the making of pins up to the shaping of steel ship beams forty feet in length. It has told how to sell and apply gas for supplying moisture for tobacco curing, for making high explosive shell, for hatching and brooding chickens, for rivet heating—*a field of rapidly increasing importance*—for ink making, for pen making, for motor testing, for soap making, for lard rendering, for tin plating, for dyeing, for reclaiming lubricating oil for re-use—*an installation in which open gas flames are played down on boiling oil to prevent it from flowing over*—for heating tin baking ovens 120 feet long, for fish curing, as a demagnetizer, for coffee roasting, etc.

The list could be run on indefinitely.

No other publication has published a fraction of this, either in quantity or quality.

Once the JOURNAL started it would have been impossible to have stopped. The tide gates were opened and the articles kept flooding in.

We would not like to have the task of going back

and reading again all these industrial articles the JOURNAL has published in the last three years.

In bulk it looms up too large for a casual study. It is a task that only one desirous of educating himself to be an industrial gas man would want to undertake.

Which brings us back to our caption.

If you are one of those who complain that the gas business is a drab and uninteresting business, that advances in its processes have gone so far that there is little opportunity to offer improvements; that, in other words, it is a field for the mechanical type of mind rather than the creative type, go into industrial fuel.

First prepare yourself by beginning to study up on the data already published. Have a decade ago you would not have found much available. To-day you will find ample and of sufficient practical value to keep you busy for several hours a day for a considerable number of months.

Intersperse your study with evenings devoted to matter pertaining to new developments that is published in the meantime and to study of the processes of industries to which gas has not yet been applied but to which it would seem it should be beneficial to.

Get practical experience in the industrial department of an open-eyed gas company.

You will find that there is at least one branch in the gas industry wherein there is always something of fresh interest to be learned, wherein the creative instinct is not smothered but wherein, on the contrary, it must always be strained to the utmost.

It is the branch that should be especially attractive to the go-ahead type of man, the one that holds out the best promise of personal advancement that exists in the gas industry to-day.

Attacking the Problem the Wrong Way

For more than a year in the State of Indiana experts and officials in the gas engineering field have been studying the problem of a heat unit standard for that State. The United States Bureau of Standards, desirous of making a series of tests and of establishing a working basis for heat standards in Indiana and elsewhere, joined in the movement, together with the Indiana Gas Association and the Indiana Municipal League. Tests were conducted at gas manufacturing plants all over the State which attracted the attention of both gas and consuming interests from all over the United States.

After this great concentrated effort and study the recommended average heating value arrived at was 570 British thermal units.

In the State of Indiana the quality of the gas is necessarily impaired because of existing conditions that are almost impossible to cope with. Nevertheless, the public not only complains, but it demands of the Public Service Commission that it enforce on the companies rules "with teeth in them," as they express it, whereby the companies would be "penalized" for serving gas of poor quality. Thus the usual unreasoning public animosity for the utility company looms up.

One would think that the managers and operators of public utilities deliberately planned to impair their service, while on the contrary the best engineering and business talent the country affords is employed in this industry solely for the welfare and convenience of the public.

But from the means the public wants to use in this particular instance we are citing, the explanation for this pronounced feeling of animosity is evident. It simply arises from ignorance of the subject. The public knows when the gas service is impaired, but it does not know why; in fact, has not thought why. Human beings do not like to think. Many of us do, of course; perhaps because we are forced to it, but we all know that thinking is the hardest work of all. So in this case, without thinking, the answer is that the fault lies entirely with the utility company; the ire of the public is roused and the easiest conclusion to arrive at without thought is the company should be punished. In order to do this, make rules "with teeth in them." When the heat standard falls below the required standard, the company shall be paid for its service according to a so-called *penalizing* scale of rates. In other words, the company shall sell heat units.

The selling of heat units has long been believed by many experts to be not only reasonable but ideal. But so far it is only a theory because no method has yet been devised whereby the theory can be applied in a practical manner to improve the existing general conditions.

Besides involving the theory of selling heat units, the *penalizing* scale, which is a sliding rate scale, involves still another problem. It would in effect permit the companies to maintain any standard they saw fit, varying from month to month, thus setting at naught all the work of the Gas Standards Committee. But what does the public know of all this?

The man whose business it is to think for the good of the public and the utility companies too, does know. He is not ignorant of the problems that arise. Therefore, he is able to think constructively and he sees the situation in a different light. He sees the fallacy of rules "with teeth." Teeth are very well in their place and serve us to good purpose, but in this case they seem to have destructive intent. And Mr. Phillips, of the United States Bureau of Standards, very clearly points this out in his statement before the Indiana conference which was called for discussion of the rules in question, when he said: "Such violations of the heat unit requirement will be the result of either accident or unforseen circumstances, or of neglect. If accident, the exaction of a penalty at a time when the company needs

assistance and co-operation in removing the difficulty, rather than fine and criticism, is unfair and undesirable. On the other hand, if the violation has been intentional or due to unexcusable neglect, the penalty is not nearly severe enough."

The punishment should fit the crime.

We believe Mr. Phillips struck the keynote when he said the company needs the assistance and co-operation of the public. This can only be attained when the public is informed concerning all conditions and problems.

Ignorance is the cause of much trouble. Those of us in the industry are not ignorant of its problems because it is our business to be informed. The AMERICAN GAS ENGINEERING JOURNAL believes that if the public were always informed concerning the situation in point it could be brought into sympathy with the utility companies and that the great stone wall of opposition and antagonism that arises on so many occasions would break away before a spirit of co-operation.

Doing Things Right

Look well to Massachusetts. By so doing you may get a liberal education in handling the problems of the present day right.

Yesterday it was a police strike in its greatest city. Its police force desired to put itself under the sway of a certain group of the national population. Had Massachusetts—for it was the State in the person of its governor which handled the affair—temporized the sovereignty of the whole people would have gone. The sovereignty of the few would have come to take its place. Though the temptation must have been great, Massachusetts did not temporize. Further, it promises well to perform a national service by setting a cardinal example in treating with its policemen, who forgot they were public servants and proved traitors to their trust and their oath.

Some weeks ago the employees of a gas company sought to limit and restrict the right of an American citizen to make a legitimate livelihood. The indefinite stoppage of the gas supply of an important city seemed a probable consequence of refusal to meet their demands. Here the onus of handling the problem lay in private hands. And these individuals, without even the confidence in public opinion that is naturally engendered by election to public office, proved firm in their trust. Demands of the striking workmen that were reasonable were granted. Those that infringed on the rights of other citizens were without reservation refused.

Some months ago Massachusetts, in glaring contrast to the "ifs-and-ands" policy adopted by so many other States, set down a reasonable heat unit standard for the Commonwealth's gas supply. Even the office of the National Fuel Administration got scary at such a step as this after it had timerously put one foot forward in the matter. Readers of a publication such as this will fail to appreciate that it requires courage to determine what B.t.u. supplies the most economical gas to the consumer. There is none required if the facts and enlightenment within one's brain are of the right order. If they are not, one is groping in the dark and hesitates naturally lest he may call "Tails" and the coin drop "Heads." Since the Massachusetts commission's finding was "almost" indorsed by the Federal Fuel Administration, and since it was most seriously considered and commented upon both in this country and in Europe, we feel confident in assuming that the facts in its possession and enlightenment on the subject concerned were of the right order. And even in this day there are many who believe it almost as commendable to be competent as courageous.

Some years ago when all was merry, when utility men literally bathed in fictitious gold pieces, Massachusetts was farsighted enough to realize that there may come a time when a too inflexible rate system might be ruinous. Such a time came. In common with the gas companies of other States, Massachusetts gas companies began to feel the pinch of the diminishing purchase power of the dollar. The obvious solution was, assuming the company to be already operating to the ultimate degree of efficiency, to get more dollars per million cubic feet of gas sold. In other States there must first come the wrangle. Massachusetts' system allowed the relief to come first and the wrangle later.

In these days of wholesale bungling, when weakness and spinelessness seem the only manner of handling important problems, it is a relief to the mind to look toward Massachusetts. Their mankind apparently still has its back supported by a good stiff spine and the habit of carrying a head around on one's shoulders has not gone out of fashion.

Master Meter, New Economic Development

A new and growing practice in the planning of buildings, particularly apartment buildings in Chicago, which emphasizes an economic phase of apartment house development here, is furnishing the gas supply for tenants through a single master-meter instead of through an individual meter for each tenant, the cost of gas service being absorbed in the rent as water service, janitor service, etc., are absorbed.

It is pointed out that the plan is advantageous to both tenant and owner. Bernard J. Mullaney, of the Peoples Gas & Coke Company, says:

"The tenant is relieved of all thought about the gas supply—ordering it turned on or off when taking or giving up an apartment, having a meter-reader call each month, paying monthly bills and so on. The owner is saved the initial cost of much expensive piping, acquires an additional selling argument in the all-inclusiveness of his building service, and is enabled to relieve the tenant of inconvenience, all without additional cost, and earn enough for himself a lower rate."

FIG. 8

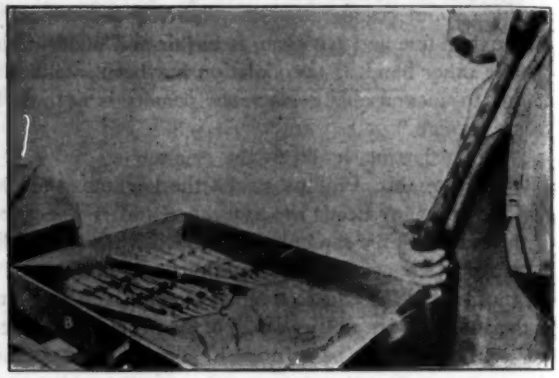


FIG. 12

Gas An Important Factor in the Manufacture of Fountain Pens

(*Continued from page* 250.)

til the sulphur and rubber have been thoroughly mixed. The mixing rolls are heated so that the rubber can be properly manipulated.

The rubber is now passed through the sheeting rolls, shown in Fig. 11, where it is rolled out into sheets about 1/32 in. thick. As the rubber sheet A passes through the rolls B, it is laid on cotton cloth in which it is wound. This cloth prevents it from sticking together and also keeps it clean. It is then wound on a roll C, so that it can be easily unrolled when cutting it up into strips for rolling on the arbors. The rolls B are heated by means of steam pipes passing through them.

The sheets are now ready for cutting up and rolling on mandrels, which form the barrel and cap of the fountain pen. This is accomplished by boys who use heated mandrels, cut the rubber into strips sufficient for a pen cap or barrel, and roll it on these arbors to the required diameter, the rolling being done on a heated smooth steel bed. Before starting to roll the rubber on the arbor, a rubber plug of the same diameter as the arbor is stuck on the end of it, which forms the end of the barrel or cap, thus converting it from a tube into a shell form. Foil is wound over the rubber to prevent the sulphur from "boiling" out, while being vulcanized.

Following this, the arbors A with the rubber and foil wound on them are placed in the steel box B, as shown in Fig. 12, an even layer of powdered soapstone being

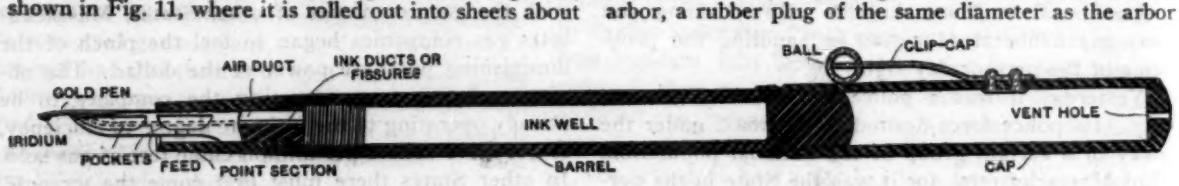


FIG. 9.—SHOWING SECTIONAL VIEW OF WATERMAN FOUNTAIN PEN

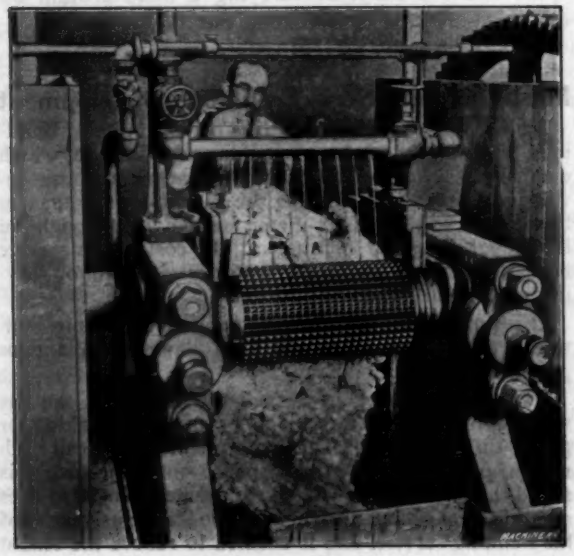


FIG. 10

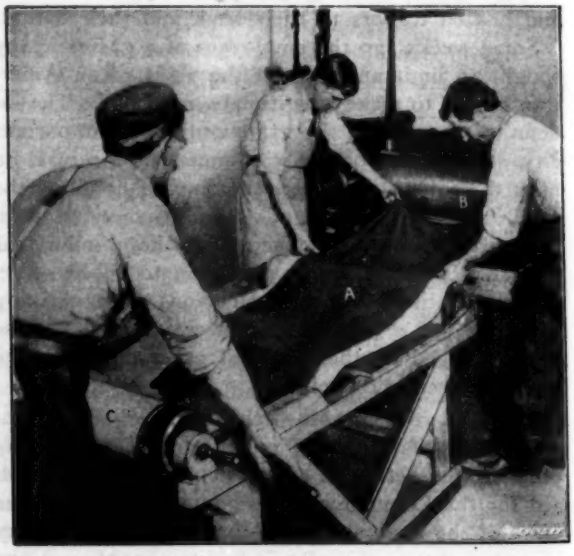


FIG. 11

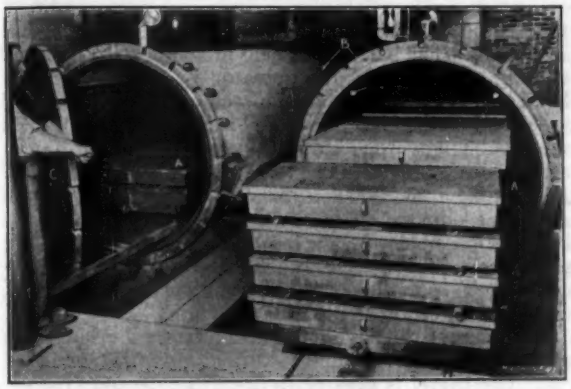


FIG. 13

first deposited in the box. Then the rubber-coated arbors are placed, as shown in the illustration, far enough apart so that they will not come in contact with one another, after which two wooden strips C are laid on top of them. More powdered soapstone is now put in, and the box is filled to the height of the top of these sticks, which act as a gage, so that the soapstone will be of an even depth. The soapstone is then tramped hard to form a mold for the parts during vulcanization. A steel cover is now locked on the box, when it is ready for placing in the vulcanizing oven.

VULCANIZING THE PARTS

As most gas men are aware, rubber before vulcanization is without shape and has a relatively small commercial value. Until the advent of the discovery of this process rubber was not used to any great extent.

Vulcanizing consists, essentially of mixing the required amount of sulphur with crude Para rubber. This amount of sulphur is about 33 per cent by weight. The whole is kept in a receptacle which is heated up to about 300 deg. Fahr. for about 14 hours. Gas plays an important part in this operation in many cases either by the employment of direct heat or else by the use of gas-heated steam boilers. Moreover, where coal is being used there may often be a good opportunity for changing over to gas, provided local conditions warrant it.

Of course, the exact time that the rubber has to be exposed to the heat in order to have the required resiliency and hardness depends to a large extent upon the size of the parts being vulcanized. The operator not only has to watch the pressure guage to determine the temperature, but he also has to follow the predetermined lines on a recording thermometer. The smaller the proportion of sulphur in rubber, and the lower the temperature used, the softer and more pliable the vulcanized rubber will be. For fountain pens, the rubber has to be sufficiently hard so that it cannot be easily bent out of shape, and still have sufficient resiliency so that all joints will be ink tight. It also has to be workable.

After the rubber pen points have been rolled on the arbors and placed in the steel boxes A, the latter are conveyed to the vulcanizing ovens B shown in Fig. 13. Here they are placed one upon the other, iron tubes separating them, on a truck which is rolled into the oven. The large iron door C is then placed on the end and held by swinging bolts. The temperature is then gradually brought up to 300 deg. Fahr.

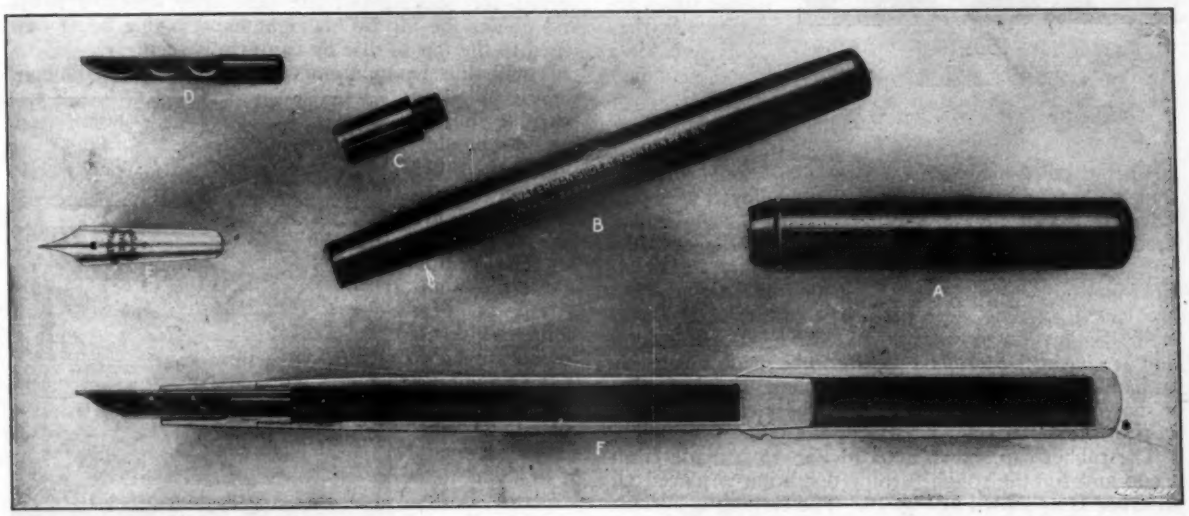


FIG. 15.—THE COMPONENT PARTS OF THE FOUNTAIN PEN AND A COMPLETE SECTION

After the rubber has been vulcanized the door is

FIG. 14

FIG. 16

taken off and the steel boxes are rolled out, when the rubber is stripped from the mandrel by a special gripper machine. The rubber parts are then ready for turning after they have been sawed to the desired lengths.

The process of rolling the rubber just described is that generally used for making the cap and barrel, but where long rubber tubes are to be made, they are extended in a special machine.

MAKING THE RUBBER CAP

Vulcanized rubber is not only used in the form mentioned for fountain pens, but is also employed to a considerable extent for many other purposes. The rubber used for fountain pens, however, is slightly softer than vulcanite which is employed in the manufacture of electrical apparatus, but it presents just as difficult a problem in turning. No automatic machines are used in the production of the rubber parts (with the exception of chasing) each part having to be made separately by hand. A general view of the rubber turning section is shown in Fig. 14. Where the turners can be seen at work making the rubber parts of the pen.

The rubber cap shown at A in Fig. 15 is made from a cup and for the rough turning operation is placed on an arbor B as shown in Fig. 16. The turning is accomplished with a flat-hand tool C, the operator holding it in one hand, grinding it with the thumb of the other hand, and placing the first finger of the left hand at the back of the work to prevent the cuttings from obscuring his view of the point of the turning tool. The free end of the arbor is supported by the tailstock center. The tool C is held on a rest D, the cutting edge being slightly above the center of the work. In this operation the tool, which was used when vulcanizing to prevent the sulphur from boiling out is also removed. The cap is now finish-turned with hand tools, after which it is reamed taper with a flat reamer. This is done so that the hole in the cap will fit the tapered ends of the barrel.

The gas man will find that the fountain pen factories will have a ready use for the usual bench forges for the hardening of the tools used and this point will be more readily appreciated if a few words be said regarding the tools used and the methods adopted in making the rubber barrel.

The rubber barrel shown at B in Fig. 15 is rough turned in a lathe in a similar manner to the cap as shown in Fig. 16. The best operation on the barrel is to finish the two tapering ends; one must fit the taper on the point section, while both ends must fit the tapered hole in the cap. This is accomplished as shown in Fig. 17. The barrel A is held in a chuck B in a small turning machine and the operator by means of a flat hand tool C turns down the tapered ends to the required taper and diameter. The tool C is held on a rest D and the taper is governed entirely by presenting the tool at the required angle. The tool is made "glass-hard." Every time a cut is taken this tool is touched up on an Arkansas oilstone so that the cutting edge is kept as keen as possible. If the tool is the least bit dull, it produces a ragged edge and also burns the work, discoloring it somewhat. While tapering the point end, the tailstock center is placed in the hole.

After the front end has been turned, the barrel, is reversed and the rear end is turned taper and rounded off. The barrel is then ready for reaming and tapping. The reaming is done with an ordinary flat reamer in a speed lathe, while the tapping is accomplished with a tap provided with only two rows of teeth, or, in other words, two cutting edges, the tap being practically flat. This operation is done in a speed lathe which is provided with cross belts, so that the spindle can be reversed for backing out the tap. The operator holds and guides the tap by his right hand, a dog being fastened to the tap so that he can grip it securely.

It will thus be apparent to the gas man that having, practically, a machine shop to consider in addition to the other sections mentioned, there are many added uses for gas over and above those apparent at first sight. This will be more evident if the remaining operations involved be considered in detail.

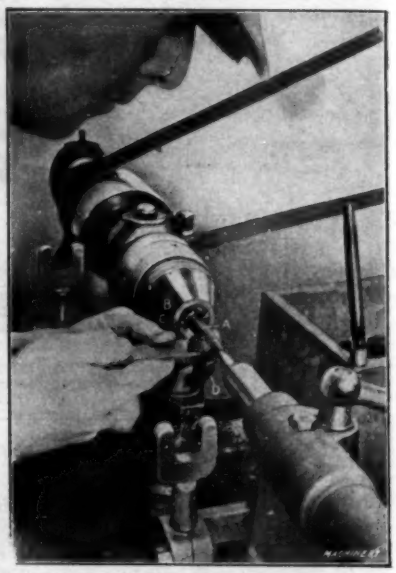


FIG. 17

MAKING POINT SECTION

The point section, shown at C in Fig. 15 is that part of the fountain pen which holds the nib and the feed. It is made from tubular rubber, produced by the extrusion process previously mentioned. The first operation is to rough-turn the outside. Then it is placed on an arbor, as shown in Fig. 18, where that part on which the thread is to be cut is rough- and finish-turned. The threading is also done while the point section A is located on the arbor B, and is accomplished with an ordinary flat chaser similar to that used by brass finishers.

The type of turning rest used for holding turning tools is clearly shown in this illustration. It consists of U-shaped supports C in which a round bar D rests. The turning tool E is fastened to the bar D and is supported on the front end by the rest F. The bar D slides freely in the U-shaped supports C, which can be set so that the tool will turn tapering by changing the position of the slide-rest G, holding one of the supports.

FIG. 18

The thread on the point section must be perfect as regards shape, that is to say, it must be of the same included angle as the thread in the barrel so that the ink cannot leak down past the threads it is also required to fit tightly in the barrel. After the thread has been cut, the front end is reamed to fit the feed and pen point, after which the external diameter is taper-turned to suit the taper on the barrel, the turning being accomplished in the manner previously described. These rubber turning lathes are rotated at about 2,000 revolutions per minute.

It is self evident that the tools require to be dressed frequently and provision should be made for the hardening by supplying a hardening furnace as well as an oil tempering bath and other necessary equipment.

MAKING THE FEEDS

The "Spoon" feed, shown at D in Fig. 15, which conveys the ink from the barrel to the pen point, is made from solid rubber, and is cut to the required length from a rubber rod about three feet long. The cut rod is grasped in a chuck B as shown in Fig. 19. The turning is accomplished by a small tool made from Crescent steel, held in a holder, which the operator holds in his right hand, guiding it by the left hand as is clearly shown in the illustration. The feed is really the most important part of the fountain pen, with the exception of the pen point, and requires very accurate work. After rod A is turned it is again cut into short lengths. Then the pockets A, shown in Fig. 20—the peculiar feature of the Waterman fountain pens—are cut. The feed is held in a small fixture, and two cutters, similar in shape to an end-mill, are brought in from each side and fed to the proper depth, and then the table carrying the feed is traversed the required distance. Both pockets on each side are cut in this manner.

Following this operation, the air vent B is made with an ordinary slitting saw about 3/64 in. wide, the slit being made about 1/16 in. deep. The next operation is to cut the ink fissure ducts. When writing, the ink passes down these fissures C, while the air passes up through the slot B, so that every drop of ink in the pen can be used. The feed is now taken to another milling fixture where it is clamped, and the bottom surface D is milled to the required shape. This is done in a small miller somewhat similar in action to a profiler, with the exception that the cutter is held in a horizontal plane instead of in a vertical position. The movement of the head holding the milling cutter is controlled by cam-faced guides of the required shape. The small air ducts E are produced with a round file. The rubber pen parts are held to a limit of 0.001 in., being gauged by the operator when turning. They are also gauged by several inspection departments.

POLISHING THE RUBBER PARTS

All the rubber parts of the pen have now been made, but are in a rough condition—not polished. The first polishing operation consists in holding the rubber pen parts on arbors, and turning them around by hand while they rest on a wet carpet-wheel buff, shown in Fig. 21, on which water is flowing. Ashes and powdered pumice stone are applied to this carpet buff A, which removes all tool marks, but does not give a glossy or polished appearance.

The next operation consists in polishing the assembled rubber parts on a cotton-wheel buff as shown in Fig. 22. The side A of this cotton-wheel is coated with rouge, and is slightly dampened, while the other side B is dry, and is not covered with any sort of polishing material. The operator holds the pen in both hands, as shown,

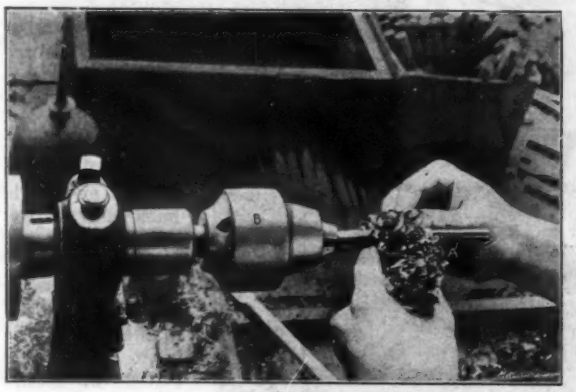


FIG. 19

passing it back and forth over this cotton buff. In the illustration the operator is holding the pen on the polishing buff. When roughing down on the buff A, coated with rouge, the pen is held in a vertical position and is moved up and down on the face of the wheel.

After polishing, the pen is tested to see that it does not leak. The assembled pen, without the feed or pen point, is located in a tank of water, and a syringe, which has a rubber tube that fits tightly in the point section, is inserted in it. Then pen and tube are placed in the water, and the bulb is pressed, forcing air into the pen. If any bubbles are seen to rise in the water, it is evident that the pen leaks, and it either has to be repaired or discarded. This test is sufficient to expose any imperfections in the fitting of the manufactured rubber parts.

The name stamping is accomplished in a special device shown in Fig. 23. The barrel is placed on an arbor on which it is clamped, this arbor being connected to a square slide B working against the tension of a spiral spring. The barrel rests between two rolls C and D, the latter roll having the stamp cut in relief, which is to be reproduced on the barrel. The handle E for operating the rolls is placed in the roll D, the latter being connected to the roll C by a block chain. The groove in the roll C is tapered slightly to correspond with that

FIG. 23

FIG. 21

on the barrel, and fits it snugly. The illustration shows a barrel just after the stamping operation, the handle E being moved to the left when stamping. The rolls are held on sliding bases, F and G, which can be adjusted back and forth by the thumb-screws H and I, so that pen barrels of various diameters can have the name rolled on them in this same fixture.

The chasing on the Waterman fountain pens is accomplished in special chasing machines, one of which is shown in Fig. 24. The barrel or cup, one of is shown in Fig. 24. The barrel or cap, as the case may be, is placed between centers. In the illustration, six barrels are being chased. The holes in these barrels A are placed on close-fitting arbors which have spur gears B fastened on the rear end. The other end of the barrel rests in a support C, which is counterbored to suit, and in which the barrel rotates. These plungers or supports C are provided with springs, so that when the thumb-screws D are loosened, the plunger will spring back, allowing the barrel to be removed.

As before mentioned, each arbor that carries a barrel is provided with a spur gear. These spur gears, in turn, are all driven from one central gear, which is located on the arbor E, the ratchet plate F also being held on this same arbor. A threaded sleeve fitting on the arbor E is cut away for part of its circumference. The full part prevents any chasing being done where the name appears on the barrel. When chasing the caps, this sleeve is entirely removed, so that the chasing may be done completely around the cap.

The machine is driven by a belt running on the pulley G, which is provided with a tooth clutch. Another tooth clutch on the shaft at the rear meshes with this tooth clutch on the pulley, so that when they are connected the machine will operate. The rear shaft is provided with an eccentric which runs in an elongated slot cut in an arm attached to the moving table of the machine. As the pulley rotates it moves the table back and forth by means of the eccentric, and as the table moves back and forth, a spring-actuated slide H comes in contact with a cam block I, both of which are beveled as shown. This action forces the spring-actuated slide in, and as it carries a ratchet which meshes with the disk F, the

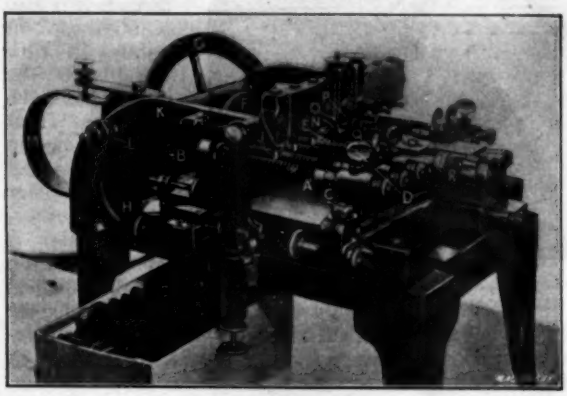


FIG. 24

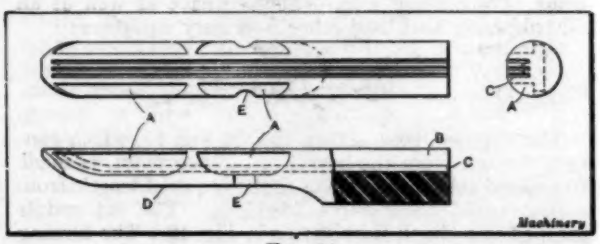


FIG. 20

latter is rotated. As this disk is connected to the central screw E, and as the screw is geared up with all of the arbors, it is evident that they all must rotate in unison.

Now directly over the center of each arbor or pen barrel is a "tool-holder" J, in which is held a black diamond, similar to those used in truing emery wheels except that they are finished—having a sharp cutting edge. All sorts of steel

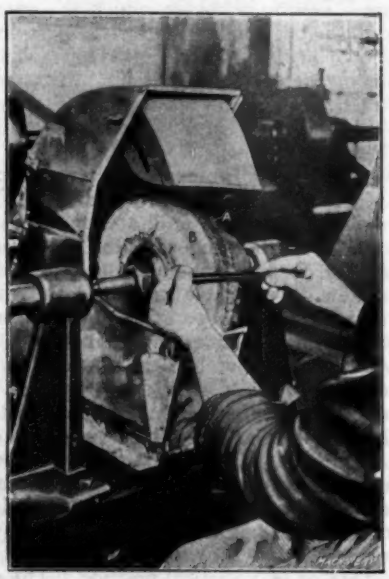


FIG. 22

cutters have been tried without success. A steel tool will work for a short time, but as soon as it becomes dull, it tears the rubber and makes a very dirty-looking job. The head K in which these diamonds are held is fulcrumed at L, and is compressed by the plate spring M. Held in the front end of the head is a stud N carrying a roller O which works on the sleeve previously mentioned, and also a stud P which works on a rack Q. This rack lifts the head K, so that the spacing between each chased space is made.

FIG. 25

The pattern is controlled by means of a cam R, held on the central stud E. This cam operates the rack Q, changing its position as the rubber barrels are rotated, and by this means the zigzag chasing effect is given to the barrels. It can, therefore, be seen that for each revolution of the driving gear, or, in other words, for each revolution of the pen barrels, six barrels are completed, the time required being six minutes.

The chasing on the barrel, as previously mentioned, does not continue entirely around its circumference. This is accomplished by a sleeve held on the central screw E, which lifts up the head K, by means of the roller O, when it rests on the full portion of the sleeve. Here the machine cuts "air" until the arbor has turned around sufficiently to allow the roller to drop off the sleeve, when the chasing again commences. The machine is stopped automatically by means of a finger attached to the ratchet plate F, which comes in contact with an arm, which, in turn, is fastened to the tooth clutch. As soon as this finger touches the slide, it depresses a spring, and at the same time pulls the former from the cam on the lever, thus allowing the latter to be acted upon by another spring, which disconnects the clutch, thus stopping the machine.

THE FOUNTAIN PEN CLIP

To the gas man the clip has much that is of import, because before it can be stamped out the metal has to be annealed and that process requires heat, gas being the form most in demand due to its ease of control.

Then the plating requires gas heat, firstly for the cleaning of the parts in the soda bath or tank, secondly for the rinsing water, thirdly for the drying operation.

PUTTING ON THE CLIP

The clip, which is used for holding the pen in the pocket, is held to the cap by means of a twin rivet. The holes for the twin rivet are drilled in an ordinary drill-press, after which the rivet is placed in a slotted arbor, the latter being inserted in the cap, then pushed up forcing the two prongs of the rivet through the holes. The cap is then taken to the foot-press shown in Fig. 25, where the operator places it on an arbor. Here the cap A with the arbor in it is laid in a groove cut in a lead block B, the latter being held in a cast-iron shoe C. The riveting is done with a small punch D, provided with a circular depression in its lower end, the operator simply pressing the foot-treadle, bringing the punch down on the top of the twin riveting prongs, and thus setting them.

The author desires to acknowledge courtesy of L. E. Waterman Company, 173 Broadway, New York City, in lending illustrations to be used in connection with this article and for supplying a considerable part of the data herein used.

The United States Fuel Administration Investigating Natural Gas Resources Says Wasteful Practices May Be Traced in Last Analysis to Cheapness

(*Continued from page* 246.)

reads, manufactured gas is substituted, and this means the burning of coal or oil, at a greater cost, and the increased cost is felt by the consumer. The statement continues:

"Thus it is significant that our natural gas supply is rapidly playing out, as shown by the fact that an average of around fifteen towns are forced to turn to manufactured gas every year. This early playing out of the available supply is due largely to wasteful practices—in fact, natural gas has earned the unenviable record of being at once the least appreciated and most abused of our natural resources.

"The National Museum exhibit shows graphically these wasteful practices, all of which may be traced in the last analysis to cheapness. They range in amount all the way from 6-in. well holes, drilled for oil and left in disgust to blow off enough gas daily to serve whole towns, to the householder who leaves jets burning all day because the gas is too cheap to make it worth while to turn it off.

"The rude awakening comes when the supply gives out and the householder is forced to buy artificial gas at four or five times the cost—the sad experience of thousands every year. The museum exhibit and bulletin are intended to analyze these sources of waste and point to a remedy before it is too late. This is one of a series of similar educational features of the division of mineral technology, which looks to the conservation of our power and energy resources. Others in the series are coal, fertilizers, petroleum, power and energy resources."

Consolidation Authorized

Authority for the Midway Gas Company to purchase the stock of the Valley Natural Gas Company and to lease the properties of the Valley company was granted by the State Railroad Commission of California. Granting the application of the Midway Gas Company, the commission said:

"The combining of the operation of the two companies will conserve the natural gas supply, decreases waste and make possible a lower operating cost and an added natural gas supply for distribution in Los Angeles and vicinity."

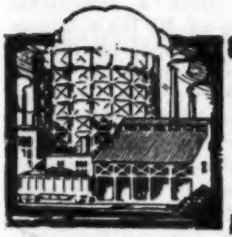
Revised List of Exhibitors at A. G. A. Convention Exhibition

W. H. Barnes, Secretary of the manufacturers' section of the American Gas Association, reports that the number of exhibitors at the convention this year far exceeds those at the conventions of the N. C. G. A. held at Washington and Atlantic City. The field is more fully represented by gas engineers, manufacturers of instruments for measuring and testing gas, as well as by a display of office labor-saving devices by well-known firms which will make the exhibition a very interesting one to engineers, commercial managers and accountants who will find ample opportunity to visit manufacturers in their own particular field.

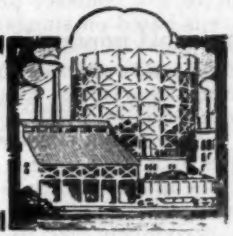
The list of exhibitors as revised to date follows. The number opposite the name refers to the booth assigned:

1. Metric Metal Works, Erie, Pa.
2. Reznor Mfg. Co., Mercer, Pa
3. Geist Mfg. Co., Atlantic City, N. J.
4. Celite Products Co., New York, N. Y.
5. Mead Gas Heater Co., Delawanna, N. J.
6. Crandall Pettee Co., New York, N. Y.
7. Safety Gas Lighter Co., Haverhill, Mass.
8. Cleveland Heater Co., Cleveland, Ohio.
9. New Process Stove Co. Div. (Am. Stove Co.), Cleveland, Ohio.
10. C. M. Kemp Mfg. Co., Baltimore, Md.
11. Union Stove Works, New York, N. Y.
12. Young Bros. Co., Detroit, Mich.
13. Reliable Stove Co. Div. (Am. Stove Co.), Cleveland, Ohio.
14. Hoffman Heater Co., Lorain, Ohio.
15. James B. Clow & Sons, Chicago, Ill.
16. Weir Stove Co., Taunton, Mass.
17. National Tube Co., Pittsburgh, Pa.
18. Wm. Kane Mfg. Co., Philadelphia, Pa.
19. American Meter Co., New York, N. Y.
20. Long-Landreth-Schneider Co., New Brunswick, N. J.
21. General Gas Light Co., New York, N. Y., and Kalamazoo, Mich.
22. Roberts & Mander Stove Co., Philadelphia, Pa.
23. Sprague Meter Co., Bridgeport, Conn.
24. Shapiro & Aronson, Inc., New York, N. Y.
25. Peninsular Stove Co., Detroit, Mich.
26. Pittsburg Water Heater Co., Pittsburgh, Pa.
27. Surface Combustion Co., New York, N. Y.
28. G. S. Blodgett Co., Inc., Burlington, Vt.
29. John J. Griffin & Co., Philadelphia, Pa.
30. Eclipse Gas Stove Co., Rockford, Ill.
31. Humphrey Co., Kalamazoo, Mich.
32. Estate Stove Co., Hamilton, Ohio.
33. General Fire Extinguisher Co., Providence, R. I.
34. Superior Meter Co., Brooklyn, N. Y.
35. Geo. M. Clark & Co. Div. (Am. Stove Co.), Chicago, Ill.
36. Ruud Mfg. Co., Pittsburgh, Pa.
37. Bryant Heater & Mfg. Co., Cleveland, Ohio.
38. Lovekin Water Heater Co., Philadelphia, Pa.
39. Michigan Stove Co., Detroit, Mich.
40. Union Steel Products Co., Ltd., Albion, Mich.
41. Erie Stove & Mfg. Co., Erie, Pa.
42. Meek Oven Mfg. Co., New York, N. Y.
43. General Gas Appliance Co., New York, N. Y.
44. Baltimore Gas Appl. & Mfg. Co., Baltimore, Md.
45. F. W. Ofeldt & Sons, Nyack, N. Y.
46. Detroit Stove Works, Detroit, Mich.
47. Improved Appliance Co., Brooklyn, N. Y.
48. Rathbone, Sard & Co., Albany, N. Y., and Aurora, Ill.
49. Welsbach Co., Gloucester, N. J.
50. William M. Crane Co., New York, N. Y.
51. Strause Gas Iron Co., Philadelphia, Pa.
52. Illinois Specialty Mfg. Co., Bloomington, Ill.
53. A. H. Wolff Gas Rad. Co., New York, N. Y.
54. Lawson Mfg. Co., Pittsburgh, Pa.
55. B. Ryan & Co., New York, N. Y.
56. Minneapolis Heat Regulator Co., Minneapolis, Minn.
57. Maxon-Premix Burner Co., Muncie, Ind.
58. Bartlett-Hayward Co., Baltimore, Md.
59. Lindsay Light Co., Chicago, Ill., and New York, N. Y.
60. Equitable Meter Co., Pittsburgh, Pa.
61. General Briquetting Co., New York, N. Y.
62. Roberts Brass Mfg. Co., Detroit, Mich.
63. Lattimer, Stevens Co., Columbus, Ohio.
64. Eclipse Stove Co., Mansfield, Ohio.
65. Bailey Meter Co., Cleveland, Ohio.
66. W. W. Barnes Co., East Orange, N. J.
67. Isbell-Porter Co., Newark, N. J.
68. Connelly Iron Sponge & Gov. Co., New York, N. Y.
69. United Lead Co., New York, N. Y.
70. H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
71. "The Gas Industry," Buffalo, N. Y.
72. Abram Cox Stove Co., Philadelphia, Pa.
73. Gehnrich Indirect Heat Oven Co., Inc., Brooklyn, N. Y.
74. Cutler-Hammer Mfg. Co., Milwaukee, Wis.
75. "The Gas Age," New York, N. Y.
76. Quick Meal Stove Co. Div. (Am. Stove Co.), St. Louis, Mo.
77. "The Gas Record," Chicago, Ill.
78. Selas Co., New York, N. Y.
79. Quigley Furnace Specialties Co., Inc., New York, N. Y.
80. Dangler Stove Co. Div. (Am. Stove Co.), Cleveland, Ohio.
81. "American Gas Engineering Journal," New York, N. Y.
82. Republic Flow Meters Co., Chicago, Ill.
83. J. B. Slattery & Bro., Brooklyn, N. Y.
84. Claus Automatic Gas Cock Co., Milwaukee, Wis.
85. Precision Instrument Co., Detroit, Mich.
86. A-B Stove Co., Battle Creek, Mich.
87. National Stove Co. Div. (Am. Stove Co.), Lorain, Ohio.
88. Milwaukee Gas Specialty Co., Milwaukee, Wis.
89. Comstock-Castle Stove Co., Quincy, Ill.
90. Perfect Combustion Co., Chicago, Ill.
91. ———
92. Underwood Typewriter Co., Inc., New York, N. Y.
93. Underwood Typewriter Co., Inc., New York, N. Y.
94. ———
95. Elliott Fisher Co., Harrisburg, Pa.
96. Kalamazoo Loose Leaf Binder Co., Kalamazoo, Mich.
97. Addressograph Co., Chicago, Ill.
98 Rand Co., No. Tonawanda, N. Y.
99. Rand Co., No. Tonawanda, N. Y.
100. Monroe Calculating Machine Co., New York, N. Y.
101. Library Bureau, Boston, Mass.
102. ———

(Continued on page 16 of Advertising Section.)



NEWS OF THE GAS INDUSTRY



Chicago Company Sells $2,100 Hotel and Restaurant Equipment at Exhibition

The Peoples Gas Light & Coke Company, of Chicago, reports that results are beginning to be in evidence from its exhibit at the Hotel Men's Show held here recently. The company had a booth showing gas appliances for hotels which attracted a good deal of attention. Over $2,100 worth of hotel and restaurant equipment was disposed of during the show, including a Pettee reel bake oven and four sections of Stewart hotel range.

Optional Rates Put into Effect

A two-way plan of gas rates has been put into effect by the Joplin Gas Company, of Joplin, Mo., Chauncey W. Smith, superintendent, announced, which became effective with the reading of meters in August. The rates are optional with the consuming public, the first being the regular straight rate of 70 cents a 1,000 ft., and the other a 50-cent rate plus $1 a month service charge.

The plan has been under consideration for some time and after being indorsed by the city council recently, the rates were prepared to be filed with the Missouri Public Service Commission. As the rates are only temporary, authorization by the city is all that is required by the Public Service Commission, Superintendent Smith explained.

"Ninety-two per cent of the patrons of the gas company will be benefited by the 50-cent rate plus $1 charge plan," said Mr. Smith, "which in reality will be a big reduction in the price of gas to them. However, all patrons have the option of accepting either, and it isn't the idea of the company to attempt to say which one the patrons shall put in use."

Gas Lighted Tennis Courts for Night Players in St. Louis

The use of gas converted an abandoned tennis court into a fairyland in which 1,500 persons made merry at the outdoor carnival of the Young Men's Hebrew Association of St. Louis last week. The site of the carnival is the rear of the association's clubhouse, and ordinarily is used for tennis courts. The use of gas lights over the courts has permitted night tennis playing by members who could not avail themselves of the privilege during the day.

When a place was sought to hold the carnival to celebrate the fourth anniversary of the local branch of the association, it was decided that the gas-lighting system furnished a made-to-order carnival ground in the tennis courts. The carnival continued for three nights.

Plant Closed Under War Conditions Recommences Manufacture of Gas

J. M. Berkeley, a Los Angeles, Cal., engineer, has decided to resume the manufacture of gas in Banning, Cal., having taken over the plant of the Riverside Gas and Power Company, which discontinued service during the stress of war and failed to operate thereafter. A proposal was made by Mr. Berkeley that if the two California cities of Banning and Beaumont would guarantee 350 consumers the plant would be operated. The required number was easily obtained. At Beaumont the Woman's Club had charge of the campaign for new consumers.

Price of Gas Coke Advances 20 Cents

The Grand Rapids Gas Light Company, Grand Rapids, Mich., advanced the price of gas coke 20 cents a ton Sept. 1, making the net price $10.30 a ton.

A Vodicka Enameling Company Changes from Oil to Gas Fuel in New Factory

Another enameling company which has decided upon the use of gas in place of coke or oil is the A. Vodicka Company, of Chicago, which is erecting a new factory for doing general jobbing in porcelain enameling. Gas has been chosen for the enamel smelter and furnaces in place of oil, which was seriously considered. The installation will be made by the Peoples company.

Controversy Over Rules and Regulations Submitted in Indiana

The engineering staff of the Indiana commission for permanent gas standards held a conference of manufactured gas and city officials in Indianapolis, Ind., for the purpose of considering the views of the city gas manufacturers and the public in general regarding a set of rules and regulations proposed by the engineering staff for the governing of gas service in the State of Indiana.

The rules call for gas of a heating standard of not less than 570 B.t.u. per cubic foot of gas as a monthly average, gas companies to collect only part of a patron's gas bill if the average falls below the standard. Many other regulations also are proposed.

The rules and regulations are based on findings of the gas standardization committee that has been working in the State of Indiana for a year under the auspices of the public service commission.

One of the rules (Rule 16) requires gas companies to maintain a certain heat standard for gas sold at contract prices, and provides that when there is deviation below that standard the consumer shall be required to pay only a per

cent of the contract price, which price is based on standard gas.

Another (Rule 11) is one recommending that cities not having gas-testing laboratories establish such laboratories or equip some one of its educational institutions to make such tests so that consumers may be informed if they do not receive standard gas.

Gas company officials are reported dissatisfied over these two rules and propose to put up a hard fight against them. The municipal league of the city of Indianapolis is reported to be for the two rules and is said to be stirring up city officials over the State to a lively interest.

Rule 16 is reported the crux of the situation. The Indiana Gas Association protested in a formal statement contending that the recent report of the gas standards committee, from which the engineering staff of the commission developed the rules in controversy, is at variance with the agreement entered into at the original conference on the subject in 1918.

The association expressed opposition to the proposed sliding scale system of rates whereunder a subscriber of a gas company in the State of Indiana would pay a lower rate automatically when the heat unit content of the gas became less. The association, at the conference, urged either elimination or modification of this ruling.

A. I. Phillips, representing the United States Bureau of Standards at the conference, said that the so-called penalizing scale of rates in Rule 16 will not accomplish the result hoped for by the commission and summed up in the bureau's objection in the following statement:

"It is not clear whether the sliding scale is intended to be a penalty or a rebate. If intended as a penalty it is undesirable, as it takes no account of the circumstances connected with the violation of the heating value requirements. Such violations will be the result either of accident or unforeseen circumstances or of neglect. If an accident, the exaction of a penalty at a time when the company needs assistance and co-operation in removing the difficulty, rather than fine and criticism, is unfair and undesirable. Such practice is apt to produce ill-feeling, the public assuming the company is to blame merely because a penalty has been exacted. On the other hand, if the violation has been intentional or due to inexcusable neglect, the penalty is not nearly severe enough. Seldom if ever has the fixing of penalties in advance for the violation of public utility regulations proved desirable in practice. It is believed far better to give the commission the power to collect penalties commensurate with the impairment of the service where violations have been due to neglect, rather than to establish in advance a definite sum to be collected under all circumstances.

Undesirable as a Rebate

"If, on the other hand, the sliding scale is to be regarded as a scale of rebates, it is none the less undesirable. The gas standards committee recommended an average heating value of 570 B.t.u. (with modifications in special cases), believing that at that value the consumer would receive the most satisfactory service both as to uniformity and cost. Manufacture would be efficient, and a suitable proportion of local fuels could be utilized. The sliding scale apparently sets at naught all the work of the committee, and in effect proposes to permit the companies to maintain any standard they desire, varying it from month to month as they see fit. If 570 B.t.u. is the correct standard for coal and water gas plants in Indiana, which the committee believes it is, then any considerable deviation from it, either up or down, will be detrimental to the consumer, the utility, or both. Furthermore, as developed by the committee and discussed at length in its report, uniformity in heating value is one of the most vital factors in good service. Within reasonable limits appliances can be adjusted for any one heating value, but they cannot be adjusted to give satisfactory service with wide variations. With the heating value varying from month to month and the consumers paying for gas at whatever heating value they received it, poor service, dissatisfaction and confusion and mistakes in accounting would inevitably result.

570 B.T.U. Conservative

"The conservative heating value figure of 570 B.t.u., monthly average, together with a reasonable daily tolerance of 30 B.t.u. above or below the average, as recommended by the committee, is believed to be a distinct step forward and much to be preferred to a sliding scale of rates which permits and seems to encourage poor service. If it be urged that gas companies will not avail themselves of the privilege of varying the heating value between wide limits, then the rule will be a dead letter and as such objectionable. We see no reason why a company should be permitted to choose its own standard regardless of economic conditions, quality of service, or any of the other considerations so fully discussed by the committee."

A number of other controversies arose over some of the other rules proposed for the adoption of the commission. Among the other rules that the gas association requested changes for was one touching on the ordering of gas main extensions.

Organizations from All Parts of the World Are Sending Representatives to Chemical Exposition

Leaders of the world in chemical arts will meet in Chicago on Sept. 22 for what is expected to be the biggest industrial exposition ever held—the Fifth National Exposition of Chemical Industries.

Early estimates that the number of delegates would approximate and possibly exceed twenty thousand are being borne out by hotel reservations.

From all parts of America, from foreign countries, experts are to take part in the one-week session during which four organizations will hold their meetings. These are the American Institute of Mining and Metallurgical Engineers, the American Ceramic Society, the American Electrochemical Society and the Technical Association, Pulp and Paper Industry.

Chemical processes will be shown by a series of moving pictures. These pictures will show the processes from removal of the product from the ground to its ultimate delivery to the consumer in finished form.

The important objects of the exposition will be progress, knowledge and economy. Organizations, commercial and industrial, from all parts of the nation are sending

representatives to Chicago to make observations, to study various subjects as they are taken up at the numerous sessions. Some time ago ocean passage was arranged for by a number of foreign chemists. They will take back to Europe the story of how America has progressed in chemistry, of how America has assumed world leadership, and they will learn why world leadership inevitably must remain with America.

Before the doors of the Coliseum and First Regiment Armory have been thrown open all of the three hundred and fifty exhibits, many of them containing new phases of greatest interest, will be in place. Several days ago the entire space for exhibits had been allotted. Many of these exhibits will deal with mining, with safety appliances and with various other phases of the industry.

Question of Supplying Gas to Other Companies Still in Controversy

The public service commission has conducted a hearing in the matter of the city of Fairmont, W. Va., against the West Virginia & Pittsburgh Gas Company. The question of supplying gas to other companies is the question being investigated by the commission, and the case is similar to that of the city of Morgantown, W. Va., against the Hope Natural Gas Company.

The public service commission some time ago ordered the West Virginia & Pittsburgh and the Hope companies to furnish gas to the respective communities of Fairmont and Morgantown. The companies failed to do so, it is alleged, and the public service commission issued an order requiring the companies to appear and show cause why this previous order should not be carried out.

The defendant companies maintain that they did not have sufficient gas with which to comply with the demands of the commission.

THE KAY COUNTY GAS COMPANY and the Marland Refining Company have a 3,700,000 gasser in their No. 1 wells on the Mary Naranjo allotment in the eastern Osage district of Oklahoma. The well was plugged back from the 1,879 depth to 1,840 ft.

Judge Grants Permanent Injunction Against Low Rate Ordinance

Declaring the rate insufficient to yield a fair return on the investment, Judge Frank A. Youmans, of Fort Smith, Ark., annulled the city's 17-cent gas ordinance by granting a permanent injunction against its enforcement. This decision was rendered in a suit filed against the ordinance in February, 1918, by the Fort Smith Light and Traction Company. H. C. Mechem, who heard the evidence as special master, found in favor of the city.

Effective Jan. 1, 1918, the traction company increased the price of gas for domestic consumption from 15 to 25 cents per 1,000 cu. ft. The city then passed an ordinance fixing the maximum price at 17 cents. A temporary injunction against the ordinance was obtained by the company from Judge Youmans, who appointed a special master to hear the case. In passing finally upon the case Judge Youmans retained jurisdiction of the cause for other and further orders changing the ruling, if changed conditions should justify such action.

In passing upon the question of the propriety of a contract through which the plaintiff corporation purchased its gas supply from its subsidiary, and which was made the subject of the city's chief attack as the grounds for the increase, Judge Youmans declared the relationship of the parties was of minor importance compared with the reasonableness of the terms of the contract.

The judge said that if the facts warranted ignoring the contract they could not warrant the ignoring of the gas which was purchased under the terms of the contract. The traction company charged that under the 15-cent rate, its gas department net earnings were $12,507.14, which did not equal 3½ per cent depreciation, which the master did not give credit for. Under the 17-cent rate, with $13,890.10 increased operating expenses, the net earnings for a year would be $4,463.43, not accounting for depreciation, it was alleged.

THE MUSKOGEE GAS & ELECTRIC COMPANY paid the regular quarterly dividend of 1¾ per cent on the preferred stock, Sept. 15.

Lone Star Company Developing Holdings for Gas on Recommendations of Geologists

Drilling operations in the northern part of Harmon County, Okla., will be begun immediately by the Lone Star Gas Company and the Dallas-Oklahoma Gas, Oil and Refining Company. A contract for joint drilling operations in that section, where the Lone Star Gas Company has extensive holdings, was agreed upon at a conference participated in by F. M. Lege, Jr., vice-president and general manager of the Lone Star Gas Company, and Charles L. Martin, president of the Dallas-Oklahoma Gas, Oil and Refining Company, and trustees of the latter company.

Considerable activity is being manifested in this section by the Texas Company, Magnolia Petroleum Company, Carter Oil Company, Empire Fuel and Gas Company, and other large companies having holdings in the immediate territory, Mr. Lege said. Colonel William Kennedy, chief geologist of the Lone Star Gas Company, has made exhaustive surveys of the section and recommended immediate drilling. H. H. Adams, geologist for the Dallas-Oklahoma company, has made similar recommendations to his company, and as a result of the recommendations of both these men immediate drilling activities will begin, Mr. Lege said.

The contract calls for a well 3,000 ft. deep or more. The Dallas-Oklahoma company has holdings of 5,000 acres in Harmon County, in addition to the holdings of the Lone Star Gas Company.

State Campaigns to Increase Company and Active Membership of the A. G. A.

When the membership committee of the American Gas Association was organized in March, 1919, a "chairman of membership" was appointed for each State. These men were selected because of their prominence in local gas company affairs and because it was thought wise to utilize the circle of local influence which they possess. Their duties consist of the formulation and execution of plans for reaching every gas company in the State and arousing the enthusiasm

of individuals for membership in the association.

Since March six lists of new members, including holding companies, gas companies, manufacturing companies and active companies, have been obtained, which is evidence of the activity of the State chairmen and the section secretaries.

On Sept. 1 the association forwarded to the State chairmen a plan for calling meetings of company executives to consider membership in the A. G. A. In his letter to the company executives the chairman said:

"There has been no time in the history of the gas industry when the complete co-operation and united influence of all companies and individuals engaged in it has been so vital to its success and progress as it is now.

"We feel that there should be an immediate and concerted effort made in each State to bring before the managing executives of gas companies which do not hold membership in the American Gas Association the need of their support and the value of the association's activities to their companies."

According to the plan as outlined, the State chairman will fix a date and place for his meeting and will then invite the executives to a round-table discussion of the purposes and useful functions of the association in the development of individual companies and the industry as a whole.

These companies that have not yet joined with the association are to be told the advantages and privileges that come with membership in the one big national body of the gas industry, with which some dozen State gas societies have already affiliated under a special agreement that gives them representation on the managing committees of each section of the association. The chairman reports that:

"The present membership of the association represents over 70 per cent of the capital invested in the industry and consists of 302 gas company members, 148 manufacturers of appliances, apparatus and equipment, and 1,700 individual members.

"The total income from dues is approximately $75,000, thus putting the association in a position to do useful and needed work for the industry and its members. The five sections thus far organized are accounting, advertising, commercial, manufacturers, and technical.

"Each company has a delegate who receives all the literature of the general association and of all its sections. The delegate has the right to attend and vote at all executive, general and sectional meetings.

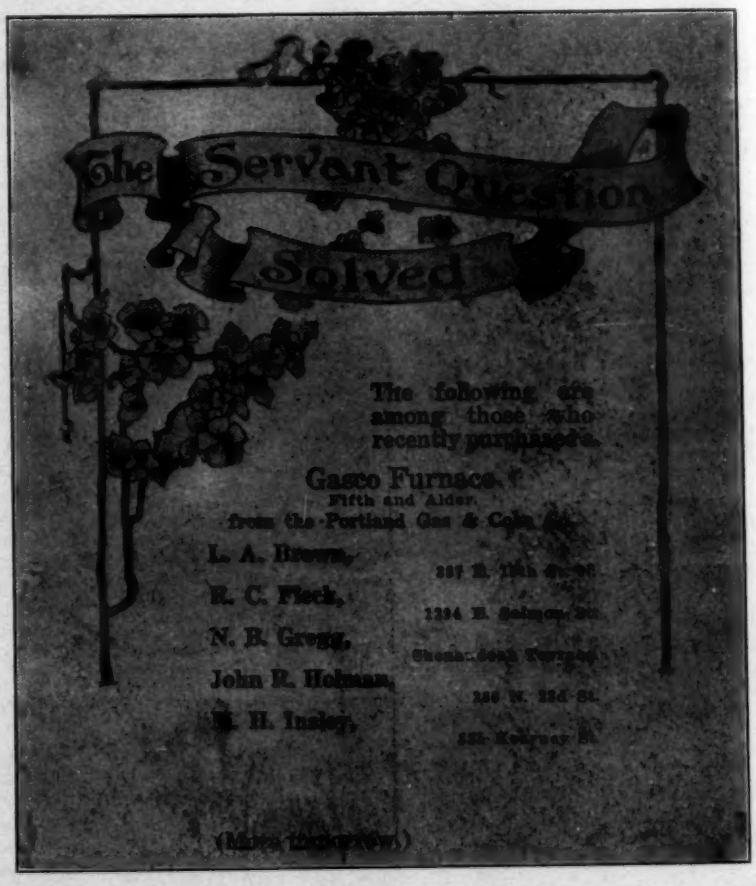
"Each section is operated as a separate unit, and its committees are selected from all parts of the country and function along lines of endeavor that will be helpful to the members and companies."

The campaign carried on at this season is intended to get as many companies as possible to make their decision regarding membership in time to join the convention forces. Meeting gas men from all parts of the country and learning how they are solving problems common to all, listening to papers and addresses on topics concerning many vital interests of the industry, studying the exhibit of appliances and making comparisons of their merits—all of these offer an opportunity which should not be lightly passed.

Leading men of the industry are doing important work for the association, the benefits of which are being shared by all companies, and they in turn owe something to the men and the organization thus striving to solve their problems.

Once a company is acquainted with the values offered by the association the chairman need only state the small sum asked as company dues—$10 per year, plus one-thirtieth of 1 per cent of the gross sales of gas. Furthermore employees of company members may join one or more sections on a prorated scale of dues, whereas those same employees, if the company is not a member, must join all sections at a cost of $15.

The association has promised in some cases where the attendance is large to have one of the directors



ONE OF THE DAILY SERIES OF ADVERTISEMENTS OF THE PORTLAND GAS & COKE CO., PORTLAND, ORE.

or headquarters staff present to assist in the meeting.

The association membership committee believes that a series of such round-table discussions will be of great benefit to the executives present and will greatly assist the association representatives in their approach to the membership problem, and achieve their main object—that of securing the interest and the membership of many new companies in the association. The letter to be sent to company executives says:

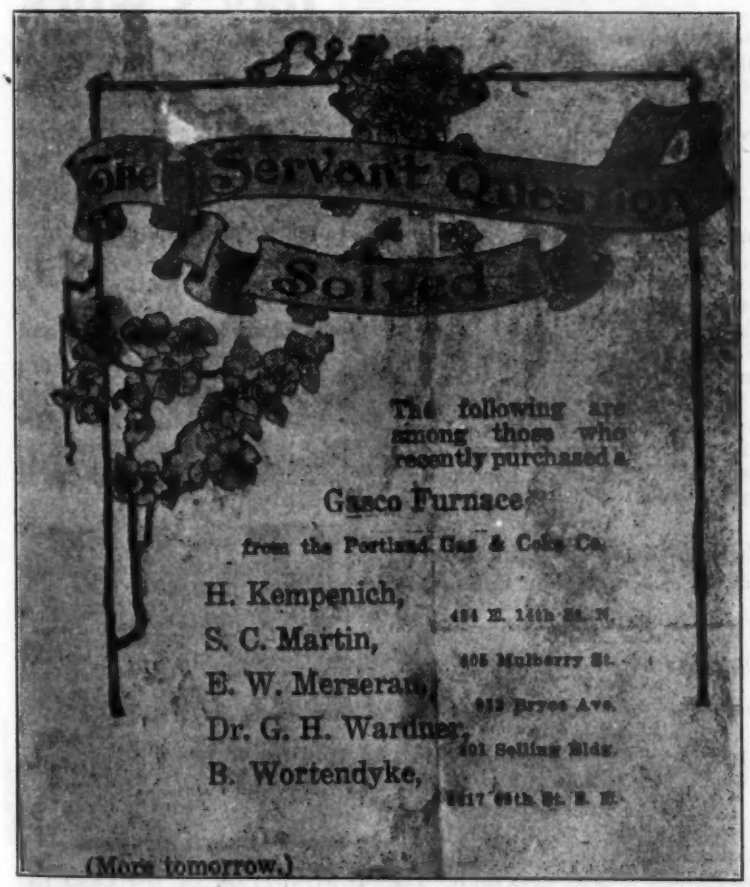
"The American Gas Association, by reason of its size, financial backing and experience in working for the interests of gas companies, is logically the organization which your company should support. It certainly is to our mutual advantage to have every gas company in the country doing its share in this co-operative movement, and we believe that your company realizes its responsibility in this connection."

New Burner Equipment in Nut Product Factory

A complete burner equipment is to be installed in the plant of the Kelling & Karel Company, of Chicago, by the Peoples Gas Light & Coke Company. The concern, which manufactures nut products, has contracted for an installation of gas burners under 23-ft. heating tanks. The operation is continuous throughout the twenty-four four hours, and about three-quarters of a million cubic feet of gas will be consumed monthly.

Powerless to Perform Duty Without Increase

The Contra Costa (Cal.) Gas Company has applied to the State Railroad Commission of California for permission to increase its meter rate, saying unless this permission is granted the company will be "seriously embarrassed if not rendered powerless properly to perform its duty as a public utility."



CONTINUATION OF THE DAILY SERIES OF ADVERTISEMENTS OF THE PORTLAND GAS & COKE CO., OF PORTLAND, ORE.

Public Service Company of Northern Illinois Will Lay New Welded Gas Line

A new 6-in. welded gas line is to be laid by the Public Service Company of Northern Illinois in the Blue Island-Harvey territory of Chicago, and important improvements are to be made in the Blue Island gas station. The effect will be to much improve the gas facilities in this district of Chicago.

The line, connecting with the present Blue Island distribution system, will be laid for a distance of three miles and will be a 40-lb. pressure main, though it will be tested at 75 lb. As stated, the joints will be welded, constituting the entire section a continuous pipe. It will be the second welded line in the system of the Public Service Company of Northern Illinois.

The soundness of the welding theory has been proved in the three years' continuous service of the "Wauconda e xtension," as it is called. In its construction the company rather than depend on transient welders decided to train its own men to the work. Two reliable laborers were selected from the Evanston force and sent to the shops of the Oxweld Acetylene Company, where they were given a short but intensive training. These men in turn trained other employees of the company. Their experience and skill will be utilized in welding the Blue Island-Harvey line.

At the Blue Island Gas Station two boilers will be added to the battery of four now in service. They will be of the horizontal return tubular type. Some moving of the machinery will be necessary to provide room for these new boilers. A better and more uniform pressure regulation will follow throughout the district supplied.

The new line and the station improvements noted will practically double the capacity of the distribution system which the line will feed. In Harvey 100 per cent more gas can be delivered. The increase is required in this town. Some of the company's largest fuel gas customers are located there. Many of the present applications of gas in varied heat-treating processes were originated in Harvey. Some of the

(*Continued on page* 18.)

applications of the fuel have influenced changes in manufacturing practice and have been examined by engineers from all sections of the country.

THE OKLAHOMA GAS & ELECTRIC COMPANY declared the regular quarterly dividend of 1¾ per cent on the preferred stock, paid Sept. 15 to stock of record Aug. 30.

The following are among those who have recently purchased

RADIANT FIRE

from the

Portland Gas & Coke Co.

W. J. Breeze, 1047 Belmont St.
Dr. S. M. Gellert, 791 Northrup St.
Otto Hermes, 4811 61st Ave. S. E.
Fred Jensen, Huber, Or.
N. J. Sykes, 445 Rodney Ave.
Mrs. N. J. Young, 6132, 62d Ave. S. E.
C. C. Dilling, 265 E. 46th St.
G. E. King, 5819 62d Ave. S. E.
A. L. Asher, 691 E. 65th St. N.
Geo. Hamblen, 247 E. 49th St.
Thomas Lacey, 374 E. 44th St.
Mrs. E. M. Hartog, 558 E. 48th St. N.
F. E. A. Smith, 711 E. Davis St.
S. E. Allen, 6419 59th Ave. S. E.
R. T. Cox, 495 E. 18th St. N.
G. A. Rathbrun, 644 E. 58th St. N.
E. E. Bragdom, Maplewood Lane.
N. R. Oliver, Maplewood Lane
Clarence R. Wagoner, 719 E. Ash St.
Dr. C. B. Wilde, Paletine Hill.
Dr. N. C. Hampton, 542 E. 16th St. N.
W. E. Waterman, 6804 51st Ave. S. E.

PORTLAND GAS AND COKE CO., OF PORTLAND, ORE., ADVERTISING RADIANT FIRE

Gas Machinery Company of Cleveland Receives Three New Contracts

The Gas Machinery Company of Cleveland, Ohio, have recently received contracts to construct water gas apparatus of their standard design for the gas companies in Kewanee, Ill., Baton Rouge, La., Columbus, Ga. These contracts also include exhausting, tar extracting and purifying apparatus, as well as valves, connections and auxiliary equipment.

Three New Industrial Contracts for Peoples Company

The Peoples Gas Light & Coke Company, of Chicago, is working on three new industrial contracts. They are installations in the Nygren Foundry Company and the Hyon Bronze Company, which have been using coke; in the third one gas will replace coal in the new coffee-roasting plant of the Rasmussen Company. The consumption of over a million feet of gas monthly is involved in these contracts.

City of Kenosha Plans for Purchase of Utilities

The voters of the city of Kenosha, Wis., by a vote of 1,216 to 1,161, advised the city council to proceed with its plans for purchase of the public utilities operated by the Wisconsin Gas & Electric Company, according to official returns.

They voted by 300 majority not to guarantee the company a return of 6 per cent on investments necessary to make extensions in the lines in Kenosha.

Revised List of Exhibitors at A. G. A. Convention Exhibition

(*Continued from page* 260.)

103. Burroughs Adding Machine Co., Detroit, Mich.
104. Burroughs Adding Machine Co., Detroit, Mich.
105. A. G. A. Accounting Section.

THE KAY COUNTY GAS COMPANY is constructing a 4-inch line in the Western Osage district of Oklahoma and has 250 men at work on it. The line will be completed into Ponca City.

The First Gas Light Used in the U. S.

David Mellville, of Newport, R. I., installed the first gas light in the United States in 1806. Baltimore was the first city to use it for lighting purposes successfully in 1817.

1

day's work

Wednesday we sold 16 Radiantfires to up-to-date families, who prefer comfort and cleanliness to dirt and ashes. 16 in 8 hours: 2 an hour!

These cool mornings and chilly evenings they are just the thing.

Come in and see them lighted up at

PORTLAND GAS & COKE CO.

Fifth and Alder.

CONTINUATION OF PORTLAND GAS & COKE CO., OF PORTLAND, ORE., RADIANT FIRE ADVERTISING